

Title	Taxonomic Studies on the Shallow Water Gammaridean Amphipoda of West Kyushu, Japan. VII. Melitidae (Melita), Melphidippidae, Oedicerotidae, Philantidae and Phoxocephalidae
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**Taxonomic Studies on the Shallow Water Gammaridean
Amphipoda of West Kyushu, Japan. VII. Melitidae
(*Melita*), Melphidippidae, Oedicerotidae, Philantidae
and Phoxocephalidae¹⁾**

By

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With Text-figures 221–263

Melitidae

Melita

Key to the species of *Melita*

- | | | |
|---|---|------------------------|
| 1 | Outer ramus of uropod 3 uniarticulate | 2 |
| | Outer ramus of uropod 3 biarticulate | 3 |
| 2 | Accessory flagellum of antenna 1 composed of 4 plus 1 rudimentary
segments; pleonites 1–3 armed with 1 dorsal tooth..... | <i>M. tuberculata</i> |
| | Accessory flagellum of antenna 1 composed of 1 plus 1 rudimentary
segments; pleonites 1–3 lacking dorsal tooth..... | <i>M. longidactyla</i> |
| 3 | Pleonites 1–3 and urosomite 1 dorsoposteriorly provided with 1
central and several side teeth..... | <i>M. denticulata</i> |
| | Pleonites 1–3 and urosomite 1 dorsoposteriorly provided with only
1 tooth | <i>M. japonica</i> |
| | Pleonites 1–2 dorsoposteriorly provided with 3 teeth, pleonite 3 and
urosomite 1 without teeth | <i>M. unamoena</i> |
| | Pleonites 1–3 and urosomite 1 lacking dorsoposterior tooth..... | <i>M. pilopropoda</i> |

***Melita tuberculata* Nagata, 1965**

Melita tuberculata Nagata, 1965c, p. 295–298.

Material examined: Ariake Sea, Tomioka Bay, Shijiki Bay.

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Melita longidactyla sp. nov.

(Figs 221–224)

Body. Head longer than pereonites 1–2 combined; anterior head lobe broadly protruded. Eyes circular, small. Pleon and urosomite 1 lacking dorsoposterior tooth; pleonal epimera 1–3 provided with 1 acute tooth posteroventrally; ventral margin of epimera 2–3 armed with 2 and 3 spines respectively. Urosomite 2 dorsoposteriorly provided with 2 encountering notches armed with 1 spine; lateral plates of urosomite 3 extending backward, hiding about half of telson.

Antennae. Antenna 1 shorter than body length; peduncle subequal to main flagellum in length; ventral side of peduncular segment 1 grooved and receiving antenna 2, armed with 3 and 1 distal spines on its inner margin; peduncular segment 2 longer than preceding segment, twice as long as preceding one; accessory flagellum about half as long as proximal segment of primary flagellum, composed of 1 plus 1 rudimentary segments. Antenna 2: peduncle longer than that of antenna 1; gland cone of peduncular segment 2 reaching almost the middle of segment 3; segments 4–5 subequal in length, about twice as long as segment 3, with several pairs of spines and several single spines on inner side.

Mouthparts. Upper lip rounded, finely pubescent apically. Lower lip: inner plate small; shoulders broad, bristly on inner side, armed with 1 trifurcate spine. Mandible: incisor medium, provided with 5 blunt teeth; lacinia mobilis with 3 teeth; accessory blades 4, pinnate; molar process much developed, serrate on lower margin, provided with 1 trumpet-formed, apically serrate appendage and 1 long plumose seta; palp consisting of three segments, of which segment 2 is about 3 times as long as segment 1 and is provided with 1 small seta and 1 pair of small setae medially; palp segment 3 subequal to palp segment 2, provided with 2 pairs of setae apically, together with several setae. Maxilla 1: inner plate rectangular, evenly flattened on apical part, with 4 plumose setae; outer plate armed with 10 tooth-like spines, 6 of these spines bifurcate, 2 of the others stout and pectinated apically; palp

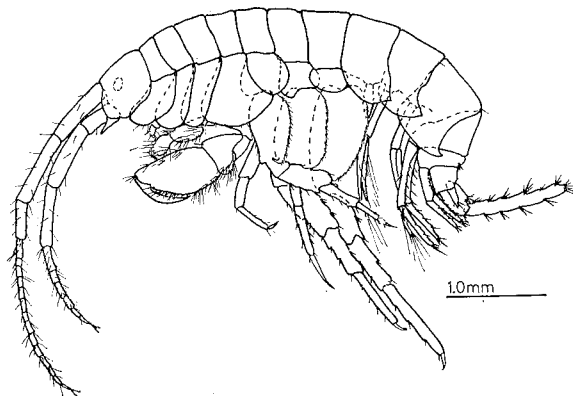


Fig. 221. *Melita longidactyla* sp. nov. Holotype, male, 5.5 mm.

consisting of two segments, the distal one of which is about twice as long as and broader than the proximal one, apically serrate with six teeth, provided with 5 apical setae and one row of 4 small and 3 long setae along the apical serrate margin. Maxilla 2 setaceous on apical part; facial part of outer plate provided with 1 transverse row of setae. Maxilliped: inner plate reaching the middle of outer plate, with 9 apical

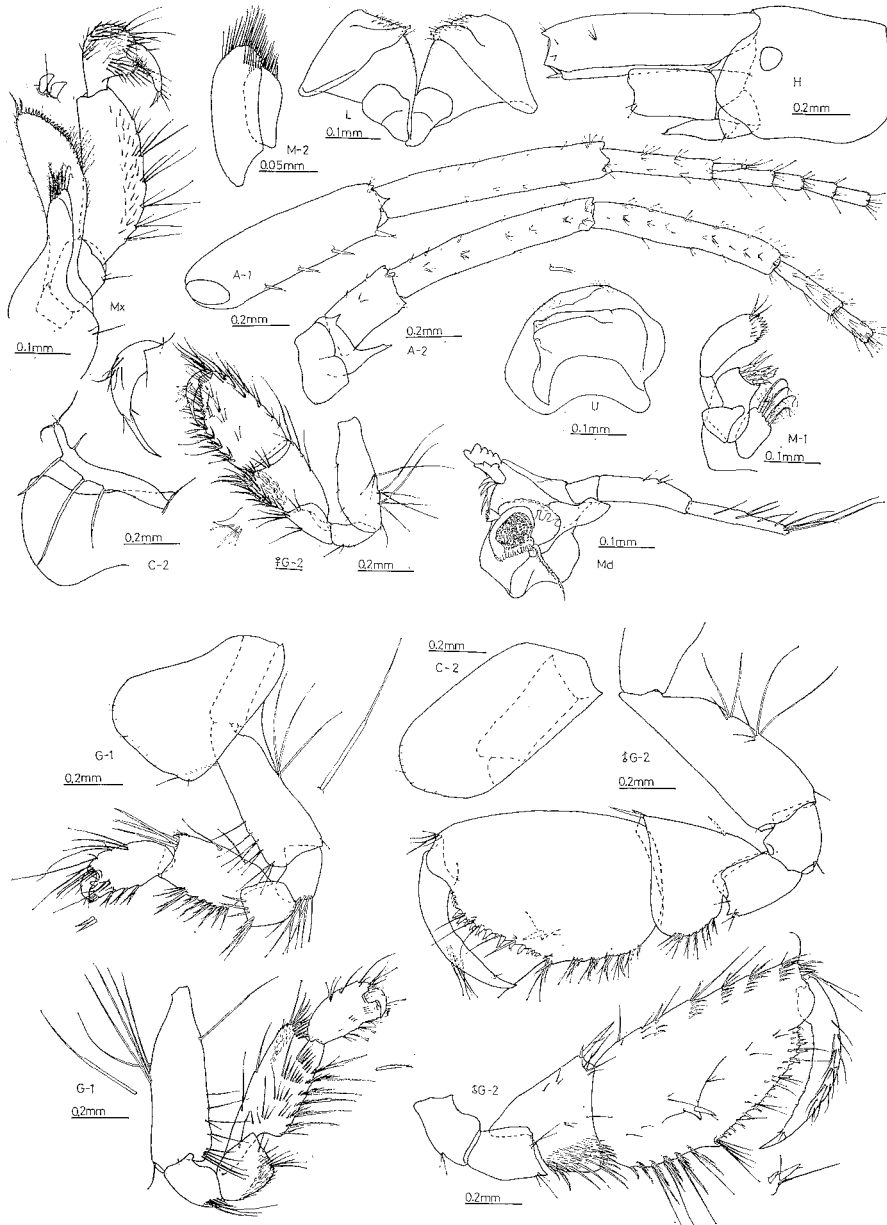


Fig. 222. *Melita longidactyla* sp. nov. Holotype, male, 5.5 mm. ♀ G-2; paratype no. 2, female, 4.5 mm.

pinnate setae; outer plate extending almost to the end of palp article 2, provided with 18 chisel-like teeth and 2 apical small pinnate setae on distal about a third the inner margin; palp consisting of 4 segments, of which segment 3 is hump-like, forming itself a ball with a handle, with bristles arranged in about 10 rows on its outer side of the swelling part and in 3 rows on the inner swelling one; palp segment 4 scimitar, with a nail, densely pubescent along its grasping margin.

Gnathopod 1. Coxa 1 gradually protruding forward to twice as broad as basal part. Basis posteromedially provided with 1 set of 4 long setae of which each proximal half is thick. Ischium posterodistally provided with 1 semicircular row of 7 long setae. Merus a little shorter than ischium, armed with 1 row of 3 thick pectinate setae posterodistally and 3 pectinate setae on medial part of outer side. Carpus rectangular except its proximal quarter which gradually expands distally, pubescent on anterodistal part, provided with 1 set of 3 thick, longer setae anterodistally and 7 posterior sets of 1 or 2 thick and a few slender setae, these setae pectinate. Complex of propod and dactyl oval, forming a prominent extension posterodistally which is armed with several thick, short pectinate setae; dactyl falcate, overlapping the posterodistal end of propod when closed.

Gnathopod 2 of male. Coxa 2 uniform in width. Basis posteromedially provided with 2 sets of 2 long and a few short setae. Merus rectangular, armed with 1 tooth posterodistally. Carpus prominently expanded backward on 2/3 part from distal end, provided with 2 unequal spines posterodistally, pubescent on inner side of its rounded posterior margin, with about 6 transverse rows of short pectinate and a few simple setae along the inner side. Propod twice as long as carpus, most expanded proximally; posterior margin half as long as anterior one, armed with 4 transverse rows of several short pectinate and 1 long unpectinate setae on inner side, with 1 single and 2 paired pectinate setae proximally; palmar defined process growing on the inner side of propod, pointed and provided with 1 spine; palm defined by a small cusp with 5 setae, oblique, provided with about 16 marginal spines and 9 small spines along inner margin. Dactyl overlapping palm when closed, falcate, with nail; setae formula of inner side 1-2-3-3-3-2-1.

Gnathopod 2 of female. As in male, though smaller than the latter, especially in carpus and propod. Anterodistal end of carpus lacking spines. Distal part of dactyl slender and elongate, bill-like.

Pereopod 1. Slender. Coxa 3 similar to coxa 2. Basis posteriorly provided with several single and paired long setae and 1 distal spine. Merus 2/3 as long as basis, projecting anterodistally, anteriorly provided with 3 spines and 1 distal set of 1 spine and 1 minute seta. Carpus about half as long as basis. Propod as long as merus, provided with 1 pair of locking spines. Dactyl slender, scimitar, as long as carpus.

Pereopod 2. Similar to pereopod 1 except for the following points; coxa 4 projecting backward medially; anterior margin of merus provided with 2 setae and 1 distal spine.

Pereopod 3. Rather slender. Coxa 5 bilobate; posterior lobe rectangular,

posteroventrally provided with 1 small tooth. Basis casteloserrate posteromarginally, protruding beyond the middle of ischium posterodistally, provided with single and paired spines and 1 distal set of 3 spines anteriorly. Ischium provided with 2 or 3 spines anterodistally. Merus about $2/3$ as long as basis, compressed proximally, projecting bilaterally at the distal end, armed with 2 or 3 marginal spines and 1 distal set of 3 or 4 spines posteriorly, with 1 proximal spine, 2 or 3 sets of 4 spines and 1 distal set of several spines anteriorly. Carpus distinctly shorter than merus, 1.5 to 2 times as broad as the latter, provided with several spines on both anterior and posterior angles of distal end and with 2 sets of several spines anteromedially. Propod as long as carpus, provided with 3 sets of several spines and 1 pair of unequal locking spines anteriorly, with short and long spines posterodistally. Dactyl falcate, nail-like distally.

Pereopod 4. As in pereopod 3, though longer than the pereopod 3 and different from the latter in form and numbers of spines as follows; anterior lobe of coxa 6 deeper and larger than one of coxa 5; carpus armed with 1 or 2 posteromedial spines, shorter than propod.

Pereopod 5. As in pereopod 4, though longer than the pereopod 4, coxa 7 semicircular and basis more expanded than one of the pereopod 4.

Pleopods. Similar to each other. Each peduncle provided with only 1 coupling spine inner-distally; swimming setae short.

Uropods. Uropod 1 extending beyond uropod 2 and peduncle of uropod 3; peduncle longer than rami, provided with 4 single spines and 1 distal set of 1 large

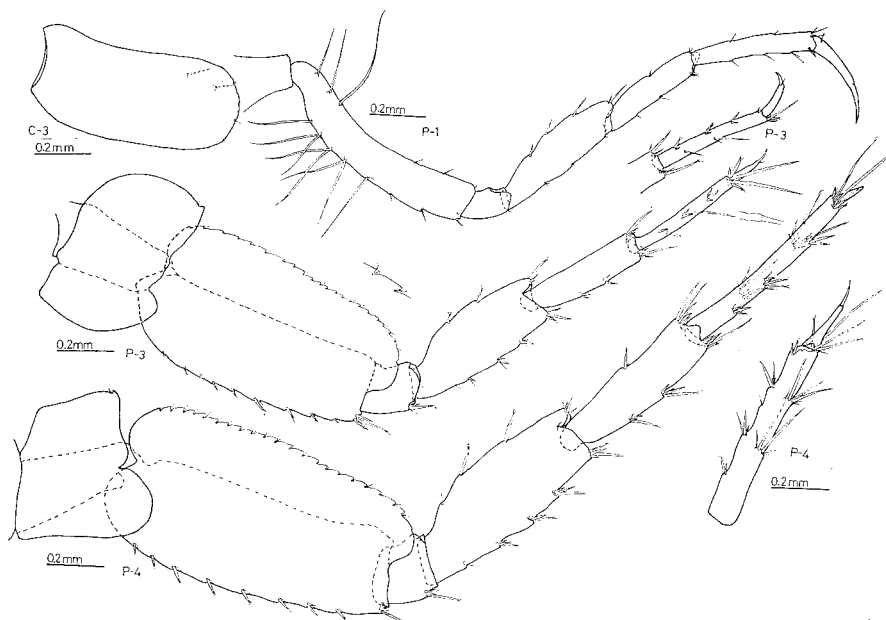


Fig. 223. *Melita longidactyla* sp. nov. Holotype, male, 5.5 mm.

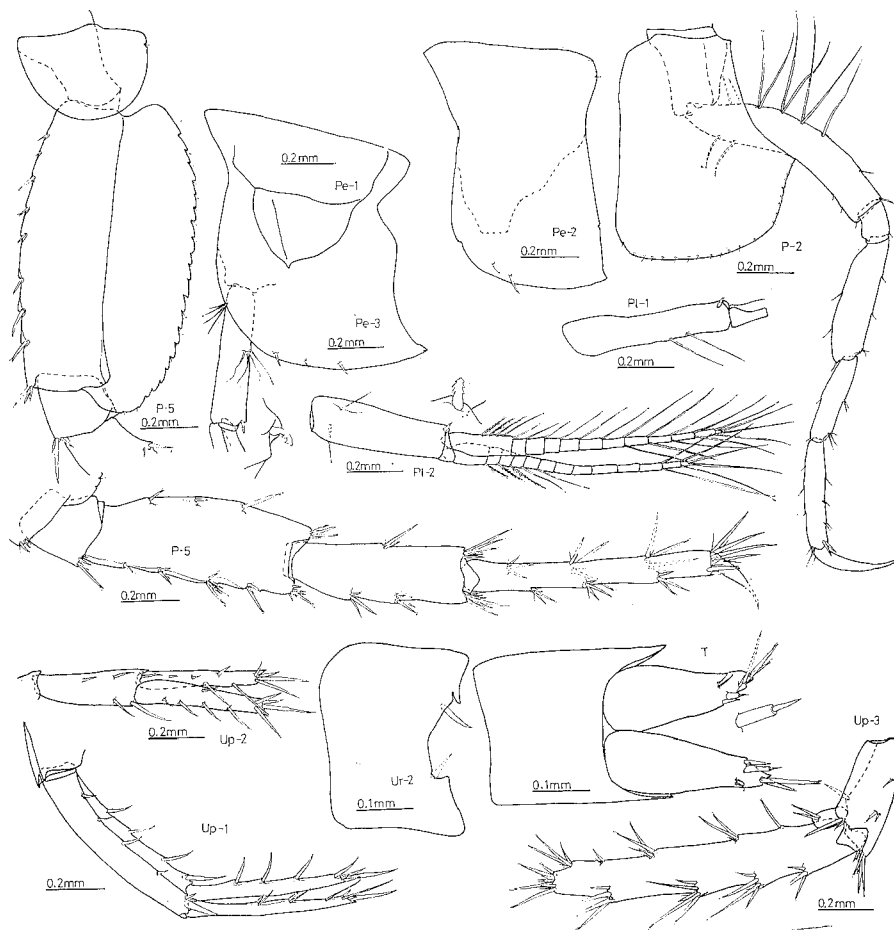


Fig. 224. *Melita longidactyla* sp. nov. Holotype, male, 5.5 mm.

and 1 small spines on outer margin, with 3 and 1 distal slender spines on inner margin; rami equal, slender, slightly projected and pointed ventrodistally, provided with 1 pronounced central and 2 small symmetrical spines apically; outer ramus with 2 pairs of 1 spine and 1 seta around a medial portion and 2 single setae near distal end; inner ramus with 4 stout single spines. Uropod 2: peduncle distinctly shorter than rami, provided with 2 slender spines near outer-distal margin and with 3 slender spines on proximal 2/3 the length of inner side; rami equal in length, apically provided with 2 pairs of spines and 1 tooth; outer ramus provided with 4 outer spines; inner ramus provided with 3 small spines on inner margin and 2 slender spines on distal half of inner margin. Uropod 3 prominently developed; peduncle as long as that of uropod 2, with a ventrally produced process which is provided with 6 spines distally, provided with 1 set of 1 pronounced and 1 small spines on upper part of outer distal end and 1 pronounced spine on inner-distal end; rami bilobate; inner ramus scale-like, with 1 pair of spines apically; outer ramus uniarticulate, 3 times

as long as peduncle, truncate and spinose apically, ventral spine formula 3-4-5-4, dorsal spine formula 1-2-4-1-3.

Telson. Entirely cleft, longer than half the peduncular length of uropod 3; each lobe gradually narrowing, pointed apically, provided with 2 or 3 apical spines; inner notch near apex with 2 paired spines, one of which is biarticulate.

Material examined. Holotype: Male, 5.5 mm. Type locality: Ariake Sea. Date: June, 1976. Paratypes: 3 specimens. Collection No.: AMBL-Amph. 16.

Remarks. The new species is similar to *Melita valesi* Karaman, 1955 (Karaman 1978), *M. koreana* Stephensen, 1944 (Stephensen 1944a), *M. laevidorsum* Stephensen, 1944 (Stephensen 1944a), *M. pahuwai* J.L. Barnard, 1970 (J.L. Barnard 1970b), *M. oregonensis* J.L. Barnard, 1954 (J.L. Barnard, 1954b), *M. nitida* Smith, 1873 (Bousfield 1973), *M. zeylanica* Stebbing, 1904 (Griffiths 1973, Ledoyer 1979) and *M. zeylanica kauerti* J.L. Barnard, 1972 (J.L. Barnard 1972a) in some characteristics as follows: the pleon and urosomite 1 are unarmed dorsoposteriorly, and the outer ramus of uropod 1 lacks the terminal segment. However, the new species is clearly distinguishable from the latter by the structure of the dactyls of pereopods 1-2. These dactyls of the present species are elongate and feeble.

Melita denticulata Nagata, 1965

Melita denticulata Nagata, 1965c, p. 293-295.

Material examined: Ariake Sea, Tomioka Bay, Shijiki Bay.

Melita japonica Nagata, 1965

Melita japonica Nagata, 1965c, p. 298-300.

Material examined: Ariake Sea, Tomioka Bay, Shijiki Bay.

Melita unamoena sp. nov.

(Figs 225-226)

Body. Anterior head lobe broad, slightly protruded; anteroventral angle armed with 1 deep notch. Eyes oval, medium. Pleonites 1-2 armed with 3 teeth dorsomedially; pleonite 3 lacking such dorsal teeth; pleonal epimera 1-2 subrectangular; posteroventral expansion of epimeron 3 prominent, directed slightly upward. Urosomite 1 slightly concave dorsomedially, armed with 3 dorsoposterior teeth; urosomite 2 dorsoposteriorly provided with 2 lateral sets of 2 teeth and 1 spine between the teeth of each set.

Antennae. Antenna 1: segment 1 of peduncle as long as head length, with 1 longitudinal row of 3 spines ventrally; peduncular segment 2 $\frac{4}{3}$ times as long as peduncular segment 1; peduncular segment 3 $\frac{2}{3}$ times as long as peduncular segment 2; accessory flagellum consisting of 4 plus 1 vestigial segments. Antenna 2:

gland cone of peduncular segment 2 extending to distal $1/3$ the length of peduncular segment 3, provided with 1 upper-distal spine; peduncular segment 3 provided with 2 upper spines; peduncular segments 4-5 subequal in length, shorter than 3 times as long as peduncular segment 3; flagellum subequal to peduncular segment 5 in length.

Mouthparts. Upper lip emarginate apically. Lower lip: inner plate well developed; shoulders provided with 4 serrate blades; mandibular process weak. Maxilla 1: inner plate provided with 9 dispersively haired setae; outer plate provided with 3 bifid, 4 pectinate and 2 simple tooth-like spines; the last-mentioned simple spines armed with 2 teeth; palp consisting of two segments, of which the proximal segment is shorter than half the length of terminal one and is provided with 1 outer-distal small seta; terminal palp segment armed with 6 conical teeth and 6 setae reciprocally on apical part. Maxilla 2: both plates equal in size, setaceous apically; outer plate provided with 1 single median seta and 1 transverse row of 7 stout setae; inner plate with 1 facial, oblique row of 23 uniplumose setae and 1 inner row of 15 short setae, distal four of which are dispersively pinnate. Mandible: rather weakly developed; incisor provided with 5 stout teeth; lacinia mobilis with 4 teeth; accessory blades 5, pinnate unilaterally; 1 or 2 pinnate setae growing near accessory blades; molar process rather weak, consisting of three segments; palp segment 1 trapezoid, with an acuminate triangular process distally; palp segment 2 twice as long as palp segment 1, with 3 medial setae; palp segment 3 as long as palp segment 2, truncate, provided with 2 apical long setae, with 2 short setae on inner side. Maxilliped: inner plate developed, provided with 1 outer row of 10 pinnate setae, 2 inner-distal stout teeth, 3 apical conical teeth and 5 small apical setae; outer plate not reaching the end of palp segment 2, provided with 11 teeth on inner-distal and apical parts; palp consisting of four segments; palp segment 2 $2/5$ as long as palp, setaceous in sets of 2 or 3 setae; palp segment 3 slightly swelling at its distal half, hairy, densely setaceous on inner-distal part; palp segment 4 falcate, provided with stout nail.

Gnathopod 1. Coxa 1 gradually protruding forward, provided with 1 notch posteroventrally. Ischium and merus bristly posteriorly. Carpus distinctly shorter than basis, provided with transverse rows of setae on inner side and both margins, with 1 inner-distal transverse row of 5 stout setae which are pectinated unilaterally. Propod shorter than carpus, oblong, elliptic, provided with many stiff setae posteriorly, bristly on inner-medial part of both margins; palm defined by 1 posteroinner spine, continuous to posterior margin of propod. Dactyl reaching the palmar spine when closed, slender.

Gnathopod 2 of male. Large, especially its propod well developed. Coxa 2 rectangular, provided with 1 posteroventral notch. Merus slightly longer than ischium, armed with 1 small tooth posterodistally. Complex of carpus and propod elliptic, 1.5 times as long as basis, provided with sets of several short setae posteriorly; posterior expansion of carpus not extending beyond merus; palm continuous to posterior margin of propod, defined by inner concavity, provided with many small

spines and several distal short setae marginally. Dactyl falcate, fitting on palmar concavity when closed.

Gnathopod 2 of female. Basis, ischium, merus and palm similar to those of male. Complex of carpus and propod about 1.5 times as long as basis, slender.

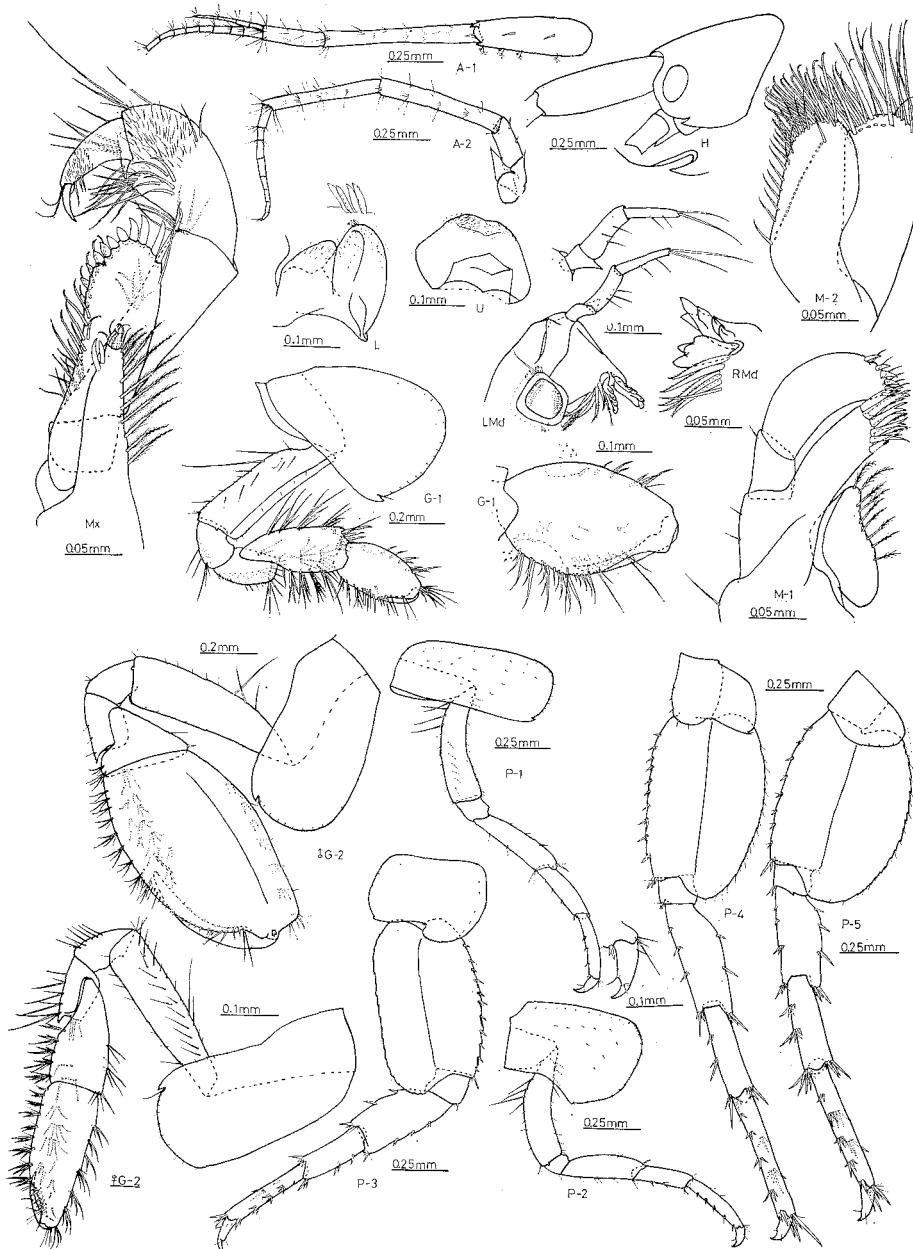


Fig. 225. *Melita unamoena* sp. nov. Holotype, male, 5.25 mm. ♀ G-2; paratype no. 7, female, 5.0 mm.

Propod clearly longer than carpus; palm slightly concave, defined by 3 inner spines, provided with 2 parallel rows of 5 and 7 small spines marginally. Dactyl falcate.

Pereopods 1-2. Similar except for coxae 3-4. Coxa 3 provided with 1 posteroventral notch. Coxa 4 slightly protruding posteroventrally. Basis $1/3$ as long as pereopod 1, armed with 4 short setae on posteroproximal curving angle. Merus $2/3$ as long as basis, slightly protruding anterodistally, with 1 small anterodistal spine. Carpus $2/3$ as long as merus, provided with 3 or 4 small spines posteriorly. Propod subequal to carpus in length, provided with 4 or 5 pairs of small spines posteriorly. Dactyl stout, short, composed of 2 parts; distal part nail-like.

Pereopods 3-5. Similar to each other except for coxae, basis and relative length of segments. Coxae 5-6 bilobate, armed with 1 minute notch posteroventrally; coxa 5 broader than coxa 6. Coxa 7 unilobate, broader than deep. Basis gradually expanding backward and becoming more rounded in order of pereopods 3-5, finely serrated posteriorly. Pereopods 4-5: ratio of merus to propod higher than in pereopod 3; both distal ends of merus more prominently protruded than in pereopod 3. Relative lengths of segments from basis to propod 7.0:1.5:4.0:3.0:4.0 in pereopod 3, 7.0:1.0:4.8:4.3:6.0 in pereopod 4, and 7.0:1.0:4.0:4.3:6.0 in pereopod 5. Two locking spines on propods unequal. Dactyl similar to that of pereopod 2.

Pleopods. Well developed, slender. Pleopod 1: peduncle $2/3$ as long as rami, provided with 1 pair of coupling spines; rami slender; inner ramus consisting of 13 segments, its proximal segment not elongate and lacking bifid setae; outer ramus consisting of 10 segments; terminal swimming setae shorter than half as long as rami.

Uropods. Uropod 1 extending beyond uropod 2 slightly; peduncle as long as rami, projected in triangle outer-distally, provided with 1 ventroproximal and 1 upper-distal pronounced spines, with 4 spines on both sides of its upper margin; rami equal, truncate; outer ramus provided with 3 spines apically; inner ramus with 5 spines of which the central one is prominent; upper-lateral margins of both rami with 3 or 4 spines. Uropod 2 not extending beyond peduncle of uropod 3; peduncle shorter than rami, armed with 1 distal pair of spines and 1 medial spine on both lateral margins of its upper side; rami equal, armed with 2 opposite and 1 central spines

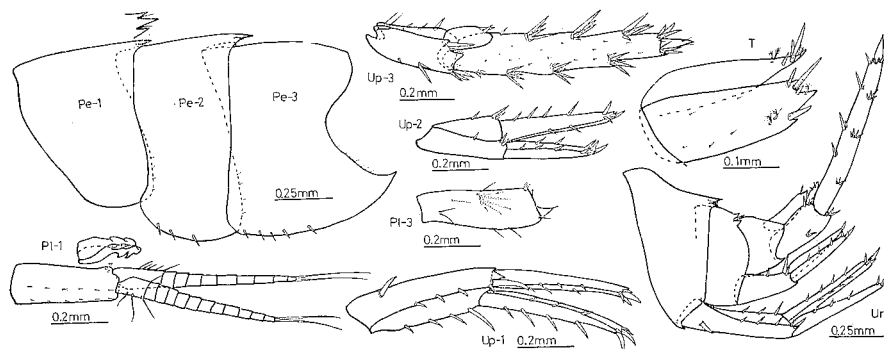


Fig. 226. *Melita unamoena* sp. nov. Holotype, male, 5.25 mm.

apically, with several spines marginally. Uropod 3 longer than uropod 1; peduncle $1/3$ as long as outer ramus, provided with 1 single, 2 paired and 4 distal spines outer-ventrally, with 1 spine on inner-distal end of its upper side; inner ramus scale-like, small, provided with 1 inner-distal pair of spines; outer ramus biarticulate, its terminal segment short and conical; proximal spine formula of proximal segment of outer ramus 2-4-5-5-2 in ventral margin, 1-4-4-4-3 in upper one.

Telson. Completely cleft, $1/4$ as long as uropod 3; each lobe bifid apically, its apical concavity provided with 3 spines; outer distal notch of lobes armed with 1 spine.

Material examined. Holotype: Male, 5.25 mm. Type locality: Tomioka Bay. Date: May, 1978. Paratypes: 6 specimens. Collection No.: AMBL-Amph. 105.

Remarks. The present species has the following characteristics in the pleon and urosome: pleonites 1-2 and urosomite 1 provided with 3 teeth dorsodistally; pleonite 3 lacking dorsodistal tooth; outer ramus of uropod 3 biarticulate. No species with the combination of these characteristics is known within the genus *Melita* to date. For example, *Melita amoena* Hansen, 1887 (Gurjanova 1951) shows the same formula of dorsal teeth on pleon and urosomite 1 as the new species, but its uropod 3 is uniaarticulate.

Melita pilopropoda sp. nov.

(Figs 227-231)

Body. Head longer than peduncular segment 1 of antenna 1; anterior head lobe evenly rounded. Eyes oval, small. Pleonites lacking teeth on dorsodistal end; pleonal epimera 1-2 armed with 1 small tooth posteroventrally; pleonal epimeron 3 gradually expanding backward, not upturned posterodistally. Urosomite 1 lacking dorsal teeth; both lateral sides of urosomite 2 armed with 1 pronounced tooth and 4 spines posteriorly, one of which is prominent.

Antennae. Antenna 1 longer than half the body length; peduncular segment 1 with a ventral groove which is armed with 3 outer and 1 inner-proximal spines; peduncular segment 2 longer than segment 1; peduncular segment 3 about half the segment 1 length; accessory flagellum consisting of 3 plus 1 rudimentary segments, provided with 1 distal hook-like spine on the segment 2. Antenna 2 about half the body length; gland cone of peduncular segment 2 extending beyond a point at basal two-thirds the length of segment 3; peduncular segment 3 armed with 1 longer and 2 paired spines ventrally; peduncular segments 4-5 equal in length, 3 times as long as segment 3; ventral side of peduncular segment 4 armed with paired and single spines.

Mouthparts. Upper lip: apical margin rounded, slightly protrudent centrally. Lower lip: inner plate broad; shoulders uneven, provided with 1 small and 1 bifid stout spines; mandibular process medium. Maxilla 1: inner plate medium, bristly,

armed with 5 apical pinnate setae; outer plate pubescent on inner-distal end, provided with 9 tooth-like spines, 5 of those spines bifid and the other 4 serrate apically; palp consisting of two segments, of which the proximal one is provided with 6 outer-distal setae; palp segment 2 provided with 5 teeth and 6 short setae reciprocally on apex, with 4 thick setae on inner-distal angle and 1 small spine on outer-distal angle. Maxilla 2: outer plate a little longer than inner one; inner side of inner plate provided with 3 medial unpectinate setae and 1 longitudinal row of 7 thick setae which are pectinate along distal half its length; apices of both plates densely setaceous. Mandible medium; incisor 5-toothed; lacinia mobilis small, bifid; accessory blades 7 in number, pectinate or pubescent; molar process well developed, rugose, provided with 1 pinnate seta; molar rasp medium; palp triarticulate, very much developed; setae on palp segment 2 growing longer; palp segment 3 as long as palp segment 2, truncate, provided with 4 apical, very long setae which grow longer on anterior side, with 2 sets of several short and longer setae on posterior margin. Maxilliped: inner plate medium, lacking apical spines, armed with 6 facial pinnate setae which get shorter, together with feeble inner-distal setae; outer plate reaching near end of palp segment 2, setaceous on inner margin, with 17 scoop-like teeth; palp consisting of four segments; palp segment 2 densely setaceous; palp segment 3 hump-like, armed with 1 circular row of setae on the inner-distal part; palp segment 4 falcate, stout, pubescent on its grasping margin, armed with a nail.

Gnathopod 1. Coxa 1 gradually expanding ventrally. Basis: posterior thin plate uniform in width, setaceous on distal two-thirds the length of it. Ischium provided with 1 transverse row of long setae posterodistally. Merus subequal to ischium in length, pubescent on distal two-thirds of its length, setaceous posterodistally. Carpus as long as basis, provided with transverse rows of setae and single setae on inner side and posterior margin; 4 anterodistal setae pectinate. Propod longer than half of basis length, gradually growing in width, prominently protruded posterodistally; anterodistal process falcate, extending beyond the posterior process, armed with 1 proximal transverse row of short setae; oblique ridge on inner side provided with 2 spines which stand with each other and grow on a point of distal a quarter its length; palm narrow. Dactyl short, stout, falcate, extending beyond

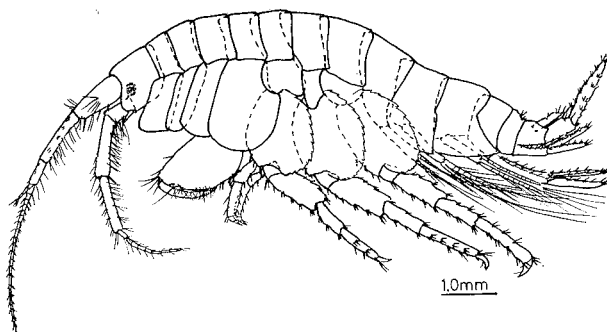


Fig. 227. *Melita pilopropoda* sp. nov. Holotype, male, 6.0 mm.

posterior process of propod when closed, provided with 1 tooth on a point at distal a third itself.

Gnathopod 2 of male. Very well developed, especially in propod and dactyl. Coxa 2 nearly rectangular. Ischium and merus subequal in length; merus prominently protruded posteriorly beneath carpus. Carpus 1.5 times as long as merus,

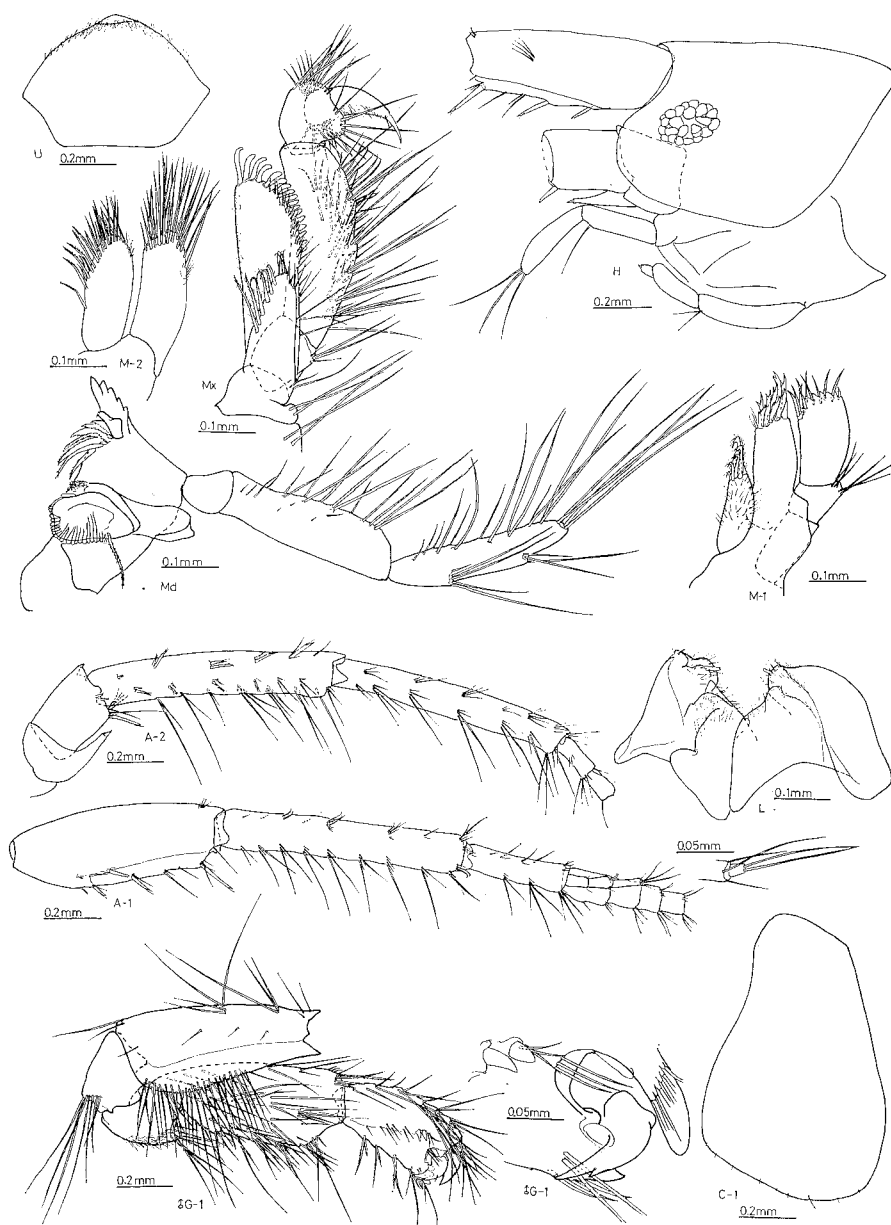


Fig. 228. *Melita pilopropoda* sp. nov. Holotype, male, 6.0 mm.

expanded backward on distal half its length but not beyond merus; inner side provided with transverse rows of setae on its anterodistal part and posterior half the distal width; most of setae pectinate on each apical half. Propod prominently larger than basis, oblong; inner side provided with transverse rows of setae densely which are pectinate on each apical half; palm gently oblique, continuous to posterior margin, spinose marginally. Dactyl falcate, not reaching a posterior spine of palp when closed, with a nail; grasping margin provided with many fine setae.

Gnathopod 2 of female. Similar to that of male in form and ratio of segment length except for ratio of carpus to propod length that is higher than in male, prominently smaller and less setaceous than in male; palm defined by only 1 inner spine, lacking other spines.

Pereopods 1-2. Similar to each other except for coxae. Coxa 3 similar to coxa 2; coxa 4 abruptly expanded backward at the middle, the broadest part about twice as broad as coxa 3. Basis gently twisted, shorter than depth of coxa 3, dispersively setaceous both anteriorly and posteriorly, most of posterior setae on pereopod 1 pinnate on each apical half. Merus $2/3$ times as long as basis, armed with 1 spine on its anterodistal extension. Carpus distinctly shorter than merus, provided with 3 or 4 sets of 1 spine and a few small setae. Propod a little longer than carpus, provided with 3 or 4 sets of 1 or 2 spines and 1 small seta posteriorly. Dactyl short, its apical half claw-like.

Pereopod 3. Coxa 5 bilobate. Basis: posterior margin perpendicular and finely serrate. Merus: both distal ends distinctly protruded, armed with several

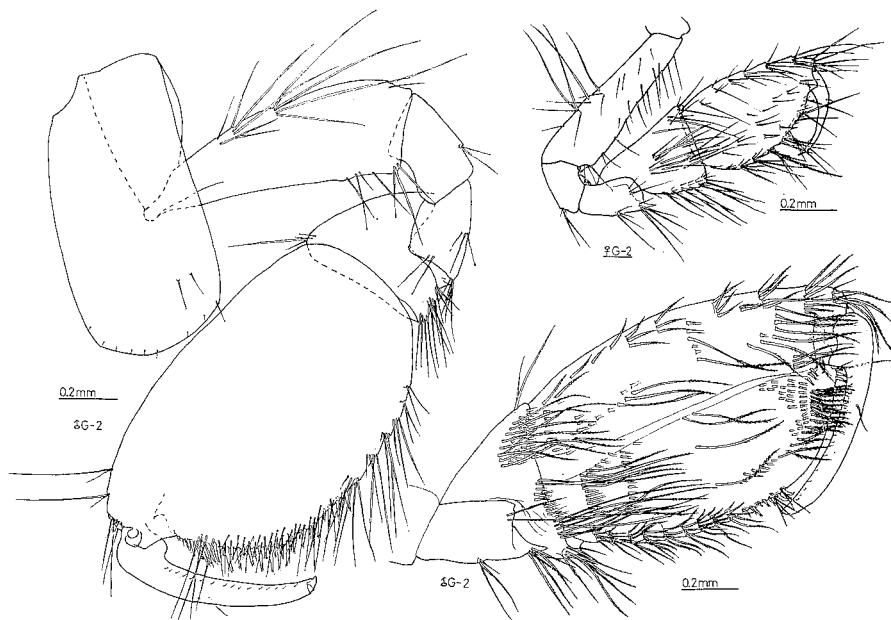


Fig. 229. *Melita pilopropoda* sp. nov. Holotype, male, 6.0 mm. ♀ G-2; paratype no. 9, female, 5.5 mm.

spines. Relative lengths of segments from ischium to propod 3.0:9.0:6.0:8.5. Locking spines paired and unequal. Dactyl short, falcate.

Pereopod 4. Longer and more spinose than pereopod 3. Coxa 6 bilobate, a little broader than coxa 5. Basis similar to one of pereopod 3. Distal extensions of merus less than in pereopod 3. Relative lengths of segments from ischium to

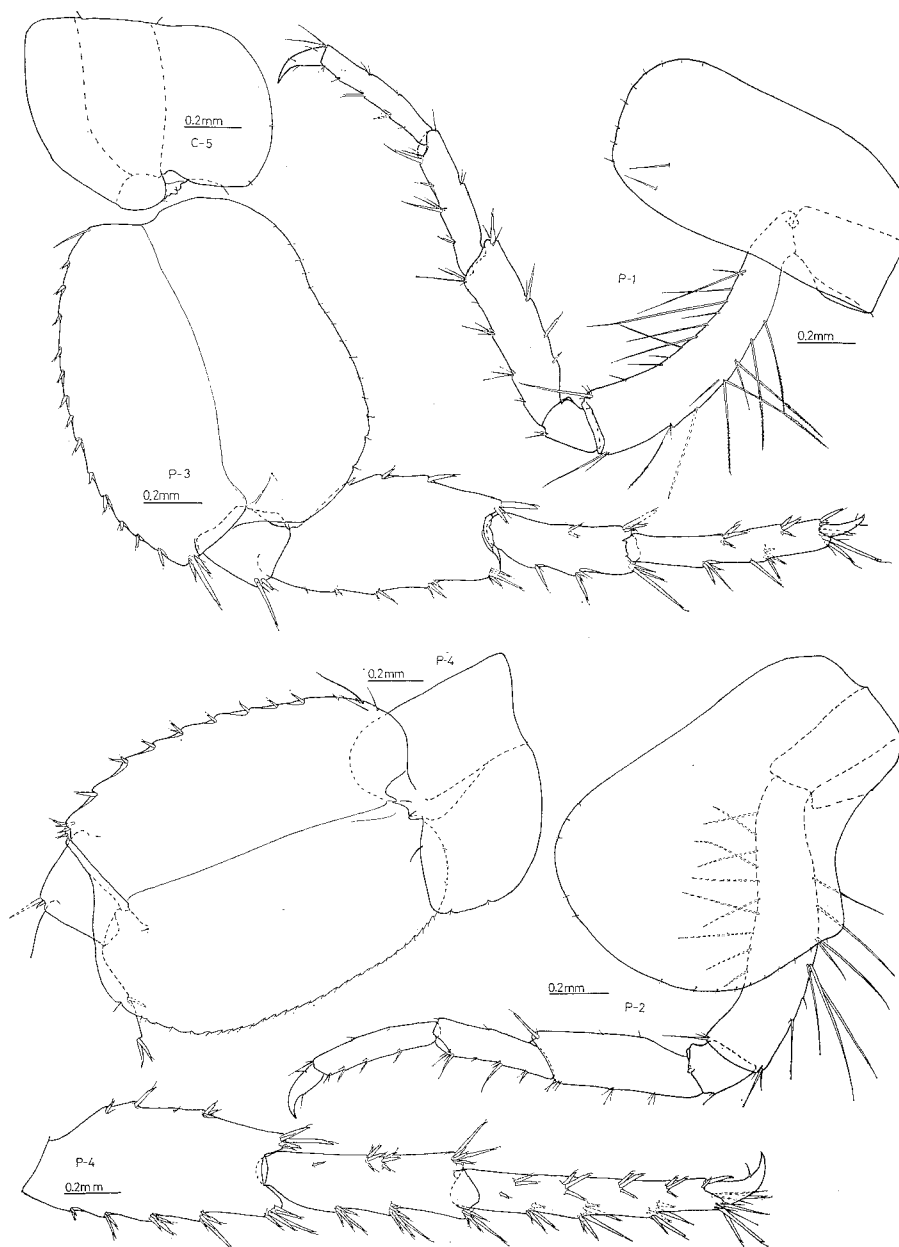


Fig. 230. *Melita pilopropoda* sp. nov. Holotype, male, 6.0 mm.

propod 3.0:9.5:9.0:11.0.

Pereopod 5. Equal to pereopod 4 in length, spinose as in pereopod 4. Coxa 7 semicircular. Basis gently expanded backward, finely serrate posteriorly. Segments from ischium to dactyl similar to these of pereopod 4; relative lengths among those segments 2.5:8.5:8.0:11.5:2.5; locking spines paired and unequal.

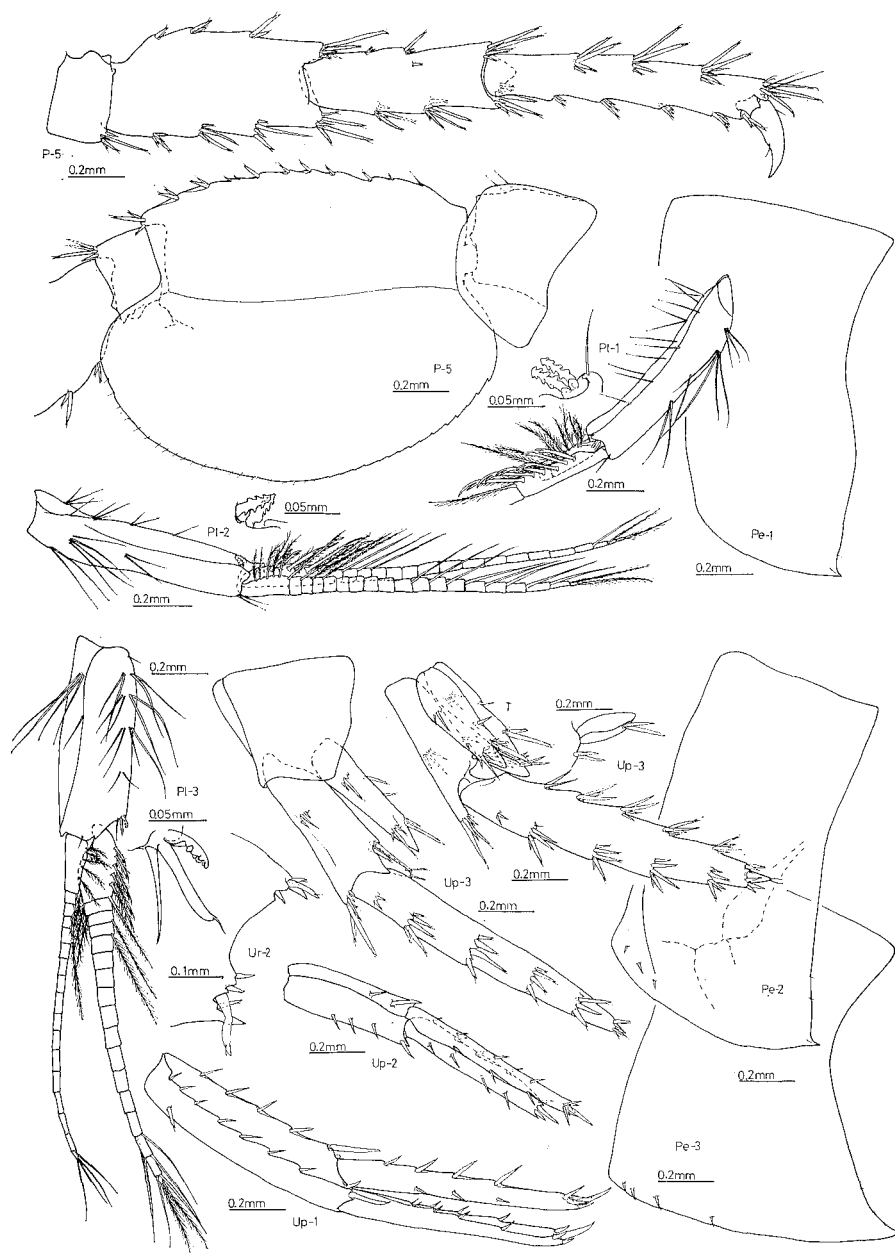


Fig. 231. *Melita pilopropoda* sp. nov. Holotype, male, 6.0 mm.

Pleopods. Similar to each other, slender. Peduncle half as long as rami, setaceous; coupling spines in pleopods 1-2 paired and serrate, but in pleopod 3 it consisting of 1 serrate and 1 unserrate longer spines and together with 1 stiff spine; proximal segment of inner ramus provided with 5 or 6 bifid and 1 simple setae; swimming setae short.

Uropods. Uropod 1 extended beyond uropod 2; peduncle subequal to rami in length, with 1 spine on ventroproximal part of its outer side and 1 apicomedial, 8 outer and 5 inner spines on its upper side; distal spines on both lateral sides stout; rami equal in length, truncate, provided with 3 or 4 smaller and 1 central large spines apically; marginal spines of the rami 3- or 4-paired. Uropod 2: peduncle $2/3$ times as long as outer ramus, provided with 4 spines on inner margin and 2 spines on distal $1/3$ part of outer side; rami protruded at both distal ends, with 1 central pronounced and 2 or 3 small spines apically, together with several spines marginally; inner ramus $4/5$ times as long as outer ramus. Uropod 3: peduncle forming ventrally a prominent extension which is provided with 6 small and stout spines distally; outer ramus biarticulate, the proximal segment longer than peduncle, spinose in sets; distal segment of the outer ramus small, conical; inner ramus small, scale-like, provided with 2 spines near apex.

Telson. Completely cleft; each lobe elliptic, taper apically, marginally with 2 sets of 1 stout and 1 or 2 smaller spines on a point at apical third the length and 2 medial spines and 1 set of 2 or 3 spines on a point at basal third the length of outer side.

Material examined. Holotype: Male, 6.0 mm. Type locality: Ariake Sea. Date: June 4, 1976. Paratypes: 9 specimens. Collection No.: AMBL-Amph. 17.

Remarks. The new species closely resembles *Melita inaequistylis* (Dana, 1852) (K.H. Barnard 1916, J.L. Barnard 1972c) in the following characteristics: the pleon and urosomite 1 lacking dorsal teeth; the pleonal epimeron 3 extending backward ventrally; the outer ramus of uropod 3 biarticulate. However, the new species is discernible from *M. inaequistylis* by the following points: in *M. inaequistylis*, dorsodistal end of urosomite 2 provided with 2 sets of 2 teeth and 1 spine, the sets of which stand with each other, and anterior head lobe provided with 1 small notch ventrally. On the other hand, the new species is also similar to *M. awa* J.L. Barnard, 1972 (J.L. Barnard 1972c), *M. latimerus* Bousfield, 1971 (Bousfield 1971), *M. matilda* J.L. Barnard, 1972 (J.L. Barnard 1972a) and *M. nitida* Smith, 1973 (Bousfield 1973) in the following characteristics: the pleon and urosomite 1 unarmed dorsodistally; the anterior head lobe lacking notch; the outer ramus of uropod 3 biarticulate. However, the new species distinctly differs from the latter in the following characteristics: in the latter species, the propod of gnathopod 1 lacking an anterodistal process, its palm oblique or almost transverse against it, defined by a rounded process; the pleonal epimeron 3 subrectangular; the palp of mandible feeble or medium; in *M. matilda*, the posterior thin plate of basis on pereopods 3-5 slender, weakly developed.

Melphidippidae

Key to the genera of Melphidippidae

- 1 Telson entire, emarginate apically *Melphisana*
 Telson cleft *Melphidippa*

*Melphisana****Melphisana japonica*** Nagata, 1965

Melphisana japonica Nagata, 1965b, p. 183–185.

Material examined: Tomioka Bay, Ariake Sea.

*Melphidippa*Key to the species of *Melphidippa*

- 1 Telson not thoroughly cleft *M. globosa*
 Telson thoroughly cleft *M. linea*

Melphidippa globosa Nagata, 1965

Melphidippa globosa Nagata, 1965b, p. 179–181.

Material examined: Tomioka Bay.

Melphidippa linea sp. nov.

(Fig. 232)

Body. Slender; coxae medium. Head lacking inferior sinus, armed with 1 small notch anteroventrally. Eyes small, circular. Pleonites 1–3 serrate dorsoposteriorly; pleonal epimera 1–2 provided with 1 ventral and 1 medial teeth posteriorly; pleonal epimera 2–3 provided with several ventral spines; pleonal epimeron 3 gradually extending upward through its posterior half, tapering posteroventrally, armed with 4 teeth posteriorly. Urosomites 1–2 serrate dorsodistally; both lateral sides of urosomite 3 distinctly protruded upward dorsodistally.

Antennae. Antenna 1: peduncular segment 1 shorter than head length, provided with 1 distal pair of stout spines; other segments unknown. Antenna 2: peduncular segment 2 square; gland cone extending to the middle of peduncular segment 3, 2/3 times as long as the segment 3; other segments unknown.

Mouthparts. Upper lip semicircular, pubescent apically. Lower lip: inner plate medium, densely hairy; outer plate densely pubescent, bristly on inner-distal parts; shoulders broad, rectangular; mandibular process medium. Maxilla 1: inner plate provided with 5 dispersively pinnate setae apically; outer plate provided

with 9 serrate or comb-like and 1 unarmed tooth-like spines apically; palp consisting of two segments, extending beyond outer plate; palp segment 2 compressed proximally, serrated apically, with 6 spines and 2 setae apically. Maxilla 2: inner plate oval, with 1 facial oblique row of 11 unplumose setae, 8 apical pectinate setae and 1 distal pectinate and 4 unpectinate setae on distal a third the length of inner margin; outer plate a little broader than the inner one, provided with 14 apical unpectinate setae. Mandible: incisor broad, protruding inward, provided with 6 teeth; lacinia mobilis broad and with 4 teeth in left mandible, though medium and bifid in right mandible; accessory blades 6 in left mandible and 5 in right mandible; molar process medium, rugose and ridged marginally, provided with 1 trumper-like process which is pectinated distally; molar rasp developed; palp consisting of 3 segments, well developed; palp segment 1 triangular, pubescent distally, provided with 1 long seta anterodistally; palp segment 2 twice as long as segment 1, with 5 inner setae which gradually get longer and especially 2 distal setae of which are long; palp segment 3 as long as segment 2, a little dilated medially, rounded apically, provided with 3 apical unplumose setae and 7 medially pinnate setae on apical half of anterior margin, together with 1 long stiff seta on outer-proximal part. Maxilliped: inner plate medium, provided with 3 conical teeth apically; outer plate reaching distal a third the length of palp segment 2, armed with 7 spatulate and 3 distal slender teeth; palp 4-articulate, slender, less setaceous; relative inner lengths of palp segments 1.5:3.5:2.0:2.0; distal palp segment falcate.

Gnathopod 1. Slender, linear. Coxa 1 subrectangular, slightly broader and serrate on its ventral margin. Relative anterior lengths of segments from basis to propod 6.5:1.5:2.0:4.0:4.0. Merus truncate, setaceous distally. Palm oblique against propod, finely pectinate. Dactyl falcate, fitting on palm when closed.

Gnathopod 2. Similar to gnathopod 1, though longer than the latter. Coxa 2 deeper than coxa 1, not serrated ventrally. Relative anterior lengths of segments from basis to propod 6.5:1.5:2.5 (excluding ventral process):6.0:6.0. Merus prominently protruding posteriorly, less setaceous than in gnathopod 1.

Pereopods 1-2. Similar to each other, though coxa 3 deeper than coxa 4. Coxae 3-4 rectangular. Relative lengths of segments from basis to dactyl 4.0:1.0:2.0:1.5:2.0:1.0. Basis twisted proximally. Merus provided with 1 anterodistal spine. Carpus with 1 pair of spines posterodistally. Propod with 1 set of 1 spine and a few minute setae and 1 pair of locking spines posteriorly. Dactyl provided with 1 posterior tooth near apex.

Pereopods 3-5. Coxae 5-6 bilobate; posterior lobe prominently expanded backward, provided with 1 notch posteroventrally in coxa 5. Coxa 7 prominently expanded backward, provided with 1 tooth posteromedially. Bases of pereopods 3 and 5 similar, slender; in pereopod 4, more dilated medially, serrate marginally, not protruded distally. Merus of pereopod 3 $\frac{2}{3}$ times as long as basis, armed with 1 pair of spines posterodistally; those of pereopods 4-5 longer than $\frac{2}{3}$ times as long as basis, spinose. Other segments unknown.

Pleopods. Peduncle shorter than rami, provided with 1 inner-distal pair of

coupling spines, together with 1 set of 4 spines on a point at apical a third the ventral length and 1 ventrodistal pair of spines in pleopod 3; proximal segment of inner ramus lacking bifid setae; terminal swimming setae longer than half the rami length.

Uropods. Uropod 1 not prominently extending beyond uropod 2; peduncle as long as rami; its ventral process triangular, provided with 2 or 3 stiff setae or

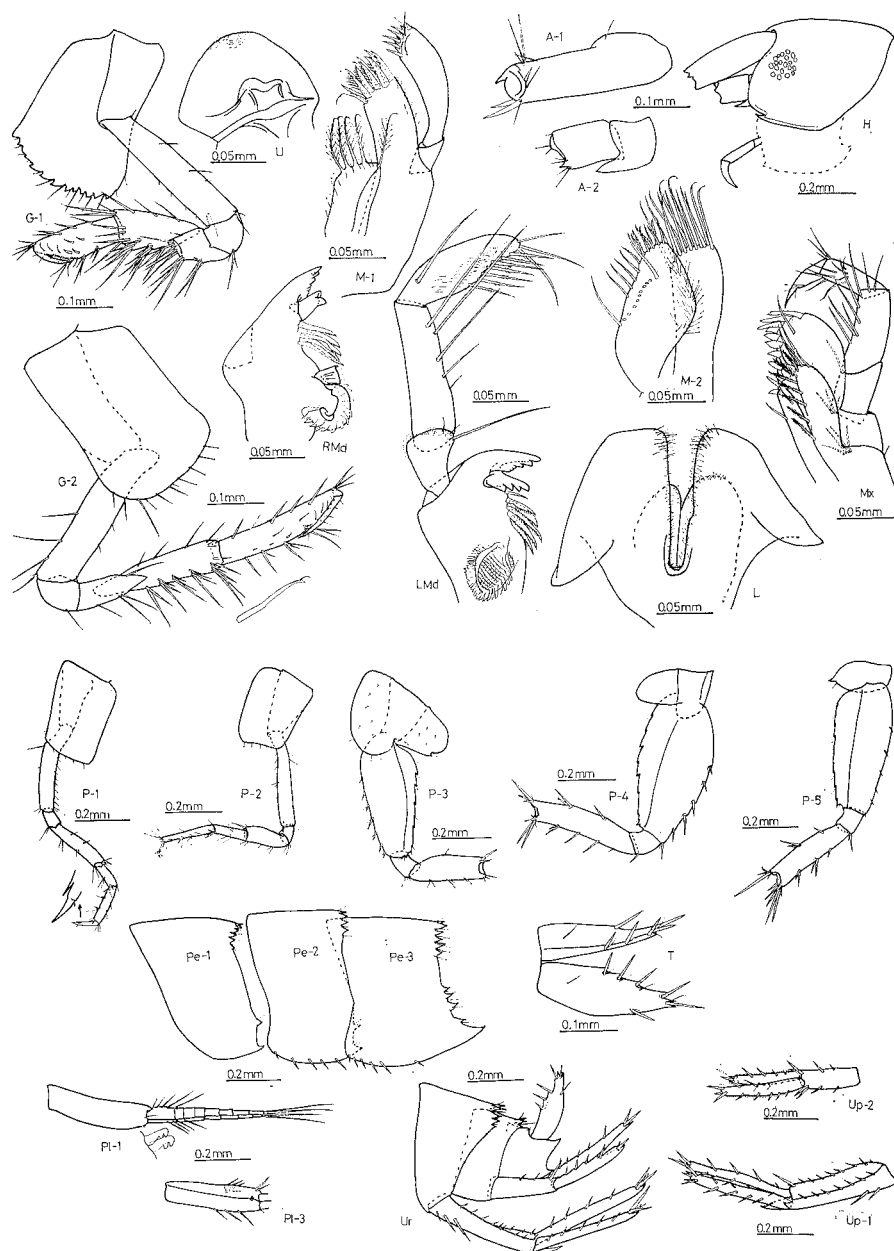


Fig. 232. *Melphidippa linea* sp. nov. Holotype, female, 3.0 mm.

spines on proximal a third the length of outer edge; both lateral edges of upper side of peduncle with many setae of which the distal ones are the longest; rami truncate, pointed ventrodistally, spinose marginally, with 2 or 3 apical spines; inner ramus longer than outer ramus, finely pectinate on inner margin. Uropod 2: peduncle shorter than outer ramus, extended inner-distally, with 1 pair of spines inner-distally; rami truncate, provided with 3 apical spines; inner ramus distinctly longer than outer ramus; inner margin of inner ramus and outer margin of outer ramus finely pectinate. Uropod 3 unknown.

Telson. Thoroughly cleft; each lobe most expanded medially, notched apically, provided with 1 spine and 1 minute seta on the apical notch, together furnished with 4 inner and 2 outer notches which are provided with 1 spine respectively.

Material examined. Holotype: Female, 3.0 mm. Type locality: Tomioka Bay. Date: May, 1978. Paratypes: 3 specimens. Collection No.: AMBL-Amph. 101.

Remarks. The accessory flagellum of the new species is unknown but this new species clearly belongs to the genus *Melphidippa* because the telson is cleft and the segment 3 of mandibular palp is twice as long as the proximal one (see J.L. Barnard 1969c).

The telsons previously known in the genus *Melphidippa* are not entirely cleft, though the telson is not described for *Melphidippa antarctica* Schellenberg, 1926 (K.H. Barnard 1930, Schellenberg 1926 and 1931) and *M. serrata* (Stebbing, 1888) (Stebbing 1906). On the other hand, the new species has the entirely cleft telson. Hence, the new species is discernible from all other species except for the above mentioned two species by the characteristic of the telson. Further, the new species differs from *M. antarctica* and *M. serrata* in the following characteristics: in *M. antarctica*, the inner plate of maxilla 1 with 21 setae instead of 5 setae in the new species; in *M. serrata*, the propod of gnathopod 2 not as long as the carpus, and its palm well excavate.

Oedicerotidae

Key to the genera of Oedicerotidae

- 1 Gnathopods 1-2 similar, carpochele and subchele.....*Periculodes*
Gnathopods 1-2 different, only gnathopod 2 chele 2
- 2 Carpus of gnathopod 2 not fused with propod*Pontocrates*
Carpus of gnathopod 2 fused with propod.....*Synchelidium*

Periculodes

Key to the species of *Periculodes*

- 1 Posterior lobe of carpus on gnathopods 1-2 not extending far beyond posterodistal end of propod *P. longirostratus*
Posterior lobe of carpus on gnathopods 1-2 extending far beyond posterodistal end of propod *P. pinguis*

Periocolodes longirostratus sp. nov.

(Figs 233-235)

Body. Stout, broad; pereon flexible; each pereonite short, though pleon developed. Head large; rostrum falcate, reaching apex of peduncular segment 1 of antenna 1; anterior head lobe weakly produced. Eyes very large, reniform. Pleonal epimera subequal in width; epimeron 1 furnished with an anteromedial expansion which is armed with 1 distal small seta, rounded ventrally, provided with 3 spines on posterior a third the length of ventral margin; epimeron 2 protruded both upper-anteriorly and posteroventrally, provided with 3 spines on the posterior acclivous part of its ventral margin; epimeron 3 rounded on ventral and posterior margins, with 4 ventral spines. Urosome slender in lateral view, broad in dorsal view; urosomite 1 subequal to pleonite 3 in dorsal length, with 1 spine on both lateroposterior edges; lateral expansions of urosomite 3 extending beyond telson.

Antennae. Antenna 1 $1\frac{1}{4}$ times as long as body length, feeble; peduncular segment 2 subequal to segment 1 in length, half as thick as the latter; peduncular segment 3 1.5 times as long as segment 2. Antenna 2: gland cone of peduncular segment 2 papillary, feeble; peduncular segment 4 as long as segment 3, setaceous ventrally and distally; peduncular segment 5 and flagellum unknown.

Mouthparts. Massive, distinctly protruded downward. Upper lip broad, e-marginate. Lower lip: inner plates coalescent, broad; outer plate rather small, obliquely astride on inner plate; shoulders broad, provided with 1 gland cone; mandibular process attenuate. Maxilla 1: inner plate oblong, with only 1 uniplumose seta apically; outer plate with 7 unserrate tooth-like spines; palp biarticulate, provided with 6 spines apically. Maxilla 2 weak; both plate equal in size; inner plate provided with 2 pairs of setae; outer plate with 6 setae. Mandible: incisor uneven apically; lacinia mobilis broad, with 1 central large and 2 side teeth; accessory blades 4 in number, simple in one mandible; one distal accessory blade in the other mandible bifid; molar process small, truncate, with 2 conical and 1 slender teeth in one mandible, and 1 conical, 1 bifid and 2 slender teeth in the other mandible; palp consisting of 3 segments, slender, these relative lengths 3.0:4.5:2.0; palp segment 2 provided with 1 longitudinal row of 4 short setae; palp segment 3 truncate, with 3 unequal setae apically. Maxilliped: inner plate rather small, triangular, provided with 3 inner-basal unequal spines and 1 apical set of 1 spine and 2 setae; outer plate

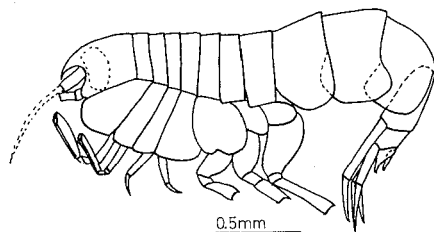


Fig. 233. *Periocolodes longirostratus* sp. nov. Holotype, female, 3.0 mm.

extending beyond palp segment 2, with 9 slender and spatulate tooth-like spines on its inner margin; palp consisting of 4 segments; palp segment 2 winged inward, setaceous on inner margin; palp segment 3 gradually expanding inward, provided with 2 inner pairs of bifid spines and 1 upper oblique row of 4 bifid spines; dactyl falcate, as long as segment 3.



Fig. 234. *Periculodes longirostratus* sp. nov. Holotype, female, 3.0 mm.

Gnathopods 1-2. Similar to each other, carpocheate, slender, almost uniform in width. Coxa 1 expanded backward posteroventrally. Coxa 2 rather slender, uniform in width. Basis about half the gnathopod length, with several long setae posteriorly. Merus a little longer than ischium, triangular, with 1 pair of small setae posterodistally. Carpus shorter than basis; proximal main part triangular;

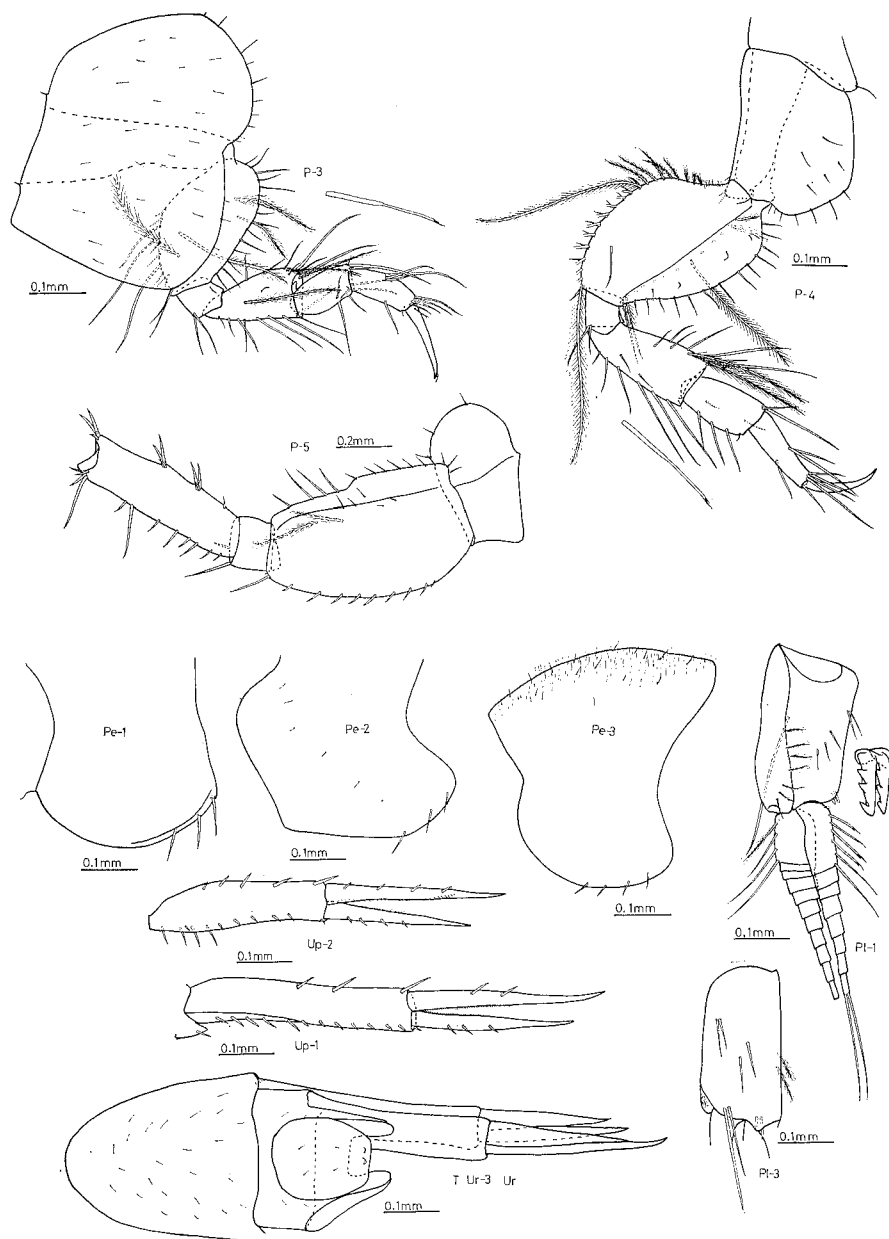


Fig. 235. *Periculodes longirostratus* sp. nov. Holotype, female, 3.0 mm.

posterior extension a little beyond a posterior end of propod, obtusa and setaceous apically. Propod: palm transverse against propod, defined by 1 spine and 1 tooth, provided with 2 parallel rows of small setae. Dactyl falcate, reaching the palm-defining spine when closed.

Pereopods 1-2. Similar to each other, slender. Coxa 3 similar to coxa 2, though broader than the latter, provided with 1 posteroventral tooth. Coxa 4 sub-square, twice as broad as coxa 3, with 1 posteroventral thick seta. Relative lengths of segments from basis to dactyl almost 8.0:2.0:4.5:2.5:3.0:3.5. Basis a little and gradually expanding through the apical half of its anterior margin, provided with 3 or 4 longer setae anterodistally. Carpus provided with 2 longitudinal rows of setae posteriorly. Propod provided with 2 oblique rows of long stiff setae on a distal part of its inner side, with 1 longitudinal row of short and longer setae posteriorly in pereopod 1 and 1 longitudinal row of longer setae in pereopod 2. Dactyl scimitar, hooded.

Pereopod 3. Coxa 5 bilobata; both lobes equal in size. Relative lengths of segments from basis to dactyl 5.5:1.5:4.5:2.5:2.5:3.2. Basis distorted-oblong; posterior thin plate most expanded proximally, attenuate. Unplumose setae on ischium, merus, carpus and propod bifid. Dactyl falcate, hooded.

Pereopod 4. Coxa 6 bilobate, half as broad as coxa 5, subrectangular. Other segments similar to those of pereopod 3, though longer than the latter and muscular part of basis provided with many short and long pinnate setae marginally.

Pereopod 5. Coxa 7 roundly expanded backward, small. Basis large, provided with many single spines, distal one of which is the longest; posterior thin plate narrow, slightly excavate medially on the hind margin. Merus shorter than basis, slightly protruded at both distal ends which are armed with several spines. Other segments unknown.

Pleopods. Developed; peduncle stout; proximal segment of inner ramus provided with 4 bifid and 2 simple pinnate setae; terminal swimming setae about half as long as rami.

Uropods. Uropod 1 not extending beyond uropod 2; peduncle longer than inner ramus, provided with 5 longer spines on the proximal half of its outer side, and 8 small outer, 2 long inner-proximal and 1 long inner-apical spines on the apical half of upper side; rami awl-shaped, finely pectinate on proximal half of these confronting sides; outer ramus shorter than inner ramus, provided with 3 outer-medial spines; inner ramus with 2 inner-medial spines. Uropod 2 similar to uropod 1, though distinctly shorter than the latter; peduncle equal to inner ramus in length, provided with 4 outer-lateral, 7 upper-outer and 5 upper-inner spines; each ramus provided with 4 spines. Uropod 3 unknown.

Telson. Subrectangular, rounded on four angles, provided with 2 confronting small setae distally.

Material examined. Holotype: Female, 3.0 mm. Type locality: Ariake Sea. Date: September, 1977. Paratypes: 3 specimens collected from Tomioka Bay in May, 1978. Collection No.: AMBL-Amph. 50.

Remarks. The new species belongs to the genus *Periiculodes* with the carpochele gnathopods 1-2 similar (J.L. Barnard 1969c, Lincoln 1979). However, this new species is clearly distinguished from the *Periiculodes* species known to date by the dactyl of pereopods 1-4; the dactyl of the latter does not exceed half the propod length, though the new species has the one subequal to the propod (see Ledoyer 1972, 1973b and 1979, Griffiths 1975, Lincoln 1979 and Schellenberg 1928). Moreover, the new species has the following important characteristics: reduced segment 3 of mandibular palp provided with only 3 apical setae, and rostrum reaching the end of peduncular segment of antenna 1. These characteristics are observed only in *Periiculodes pallidus* Griffiths, 1975 (Griffiths 1975), but *P. pallidus* lacks eyes and inner plates of lower lip, and has aberrant mandibles and the midterminally protruded telson. Further, the basis of pereopod 5 in *P. pallidus* is prominently smaller than that of pereopod 4, and is most expanded at distal one-third of its length instead of the basal part in the new species.

***Periiculodes pinguis* sp. nov.**

(Figs 236-238)

Body. Chubby, slightly depressed. Head massive, galeate; rostrum abruptly curved downward, extending to the end of peduncular segment 1 of antenna 1; superior antennal sinus deeply concave as a semicircle in its upper part. Eyes large, aberrant in form; ommatidia dispersive. Pleonal epimera 1-3 rounded except for a perpendicular posterior margin of epimeron 2; epimeron 1 extended backward. Urosome as long as pleonite 3, depressed.

Antennae. Antenna 1 about a quarter the both length, lacking accessory flagellum; peduncle gradually reduced in size, its segment 1 stubby; main flagellum 8-articulate, its proximal segment as long as peduncular segments 2-3 combined, provided with about 20 rows of aesthetascs ventrally, while its distal two segments lacking aesthetasc. Antenna 2 longer than body length; gland cone of peduncular segment 2 small; peduncular segment 3 protruded ventrodistally; peduncular segments 4-5 subequal in length; segment 1 of flagellum attaining half of the peduncular segment 5 in length.

Mouthparts. Upper lip triangular, slightly concave midterminally. Lower

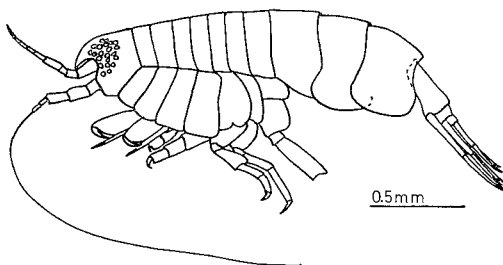


Fig. 236. *Periiculodes pinguis* sp. nov. Holotype, female, 2.5 mm.

lip: inner plates coalescent with each other, broad; outer plate weakly developed, attached onto a lateral side of inner plate; shoulders uneven; mandibular process medium. Maxilliped: inner plate medium, provided with 1 apical seta; outer plate with 3 minutely bifid spines, and 2 serrate and 2 unserrate tooth-like spines; palp biarticulate, the terminal segment with 6 setae on the apical one-third of its length. Maxilla 2 weakly developed; both plates equal in size, not completely divided, provided with 4 or 5 setae apically. Mandibles weakly developed, though palp well developed; incisor broad, extended inward, provided with 1 inner and 3 outer conical teeth; lacinia mobilis broad and provided with 5 teeth in left mandible, small and bifid in right mandible; accessory tooth-like spines 4 in number; molar process pseudotrutritative, truncate, provided with 2 stout, segmented teeth apically; palp consisting of three segments; palp segment 2 3 times as long as palp segment 1, with 4 different setae on the proximal half of its inner length; palp segment 3 shorter than segment 2, comb-like, provided with 3 apical thick setae. Maxilliped: inner plate small, provided with 3 setae apically; outer plate extending beyond the middle of palp segment 2, with 4 stout spines; palp consisting of four segments, dispersively setaceous on inner margin; palp segment 3 half as long as segment 2; dactyl falcate, as long as segment 3.

Gnathopods 1-2. Similar in form and size, carpochele. Coxae 1-2 rectangular. Carpus and propod combined subequal to basis in length. Carpus: proximal triangular part short; posterior lobe slender, extending to the end of propod, tapering. Propod uniform in width; palm oblique against the propod, defined by 1 stout spine; small spines on outer side of palm hooked. Dactyl overlapping on palm when closed, hooded.

Pereopods 1-2. Similar to each other. Coxae 3-4 rectangular; acute postero-ventrally, provided with 1 stout longer seta posteroventrally; the latter 1.5 times as broad as the former. Relative lengths of segments from basis to propod 5.0:1.0:4.0:2.5:2.2 in pereopod 1, though 6.0:1.0:4.5:2.5:2.2 in pereopod 2. Merus, carpus and propod setaceous. Propod provided with 2 oblique rows of setae on an apical portion of inner side, proximal half of these setae thick. Dactyl arising from inner distal end of propod, about half as long as propod, hooded.

Pereopod 3. Coxa 5 subsquare, slightly concave ventrally, about twice as broad as coxa 3. Basis nearly oblique, not protruded posteriorly; bound between muscular part and thin plate provided with pinnate setae of various lengths. Merus gradually broadening until twice of basal width, setaceous on anterior margin and apical half of posterior margin; several setae pinnate, most of unpinnate setae long. Carpus provided with 3 slender spines on a midway of anterior margin and 3 long, thick setae posterodistally. Propod as long as carpus, provided with 4 single, 2 distal paired setae posteriorly which are thick. Dactyl 1/3 times as long as propod, stout, hooded.

Pereopod 4. Coxa 6 rectangular, provided with 1 posteroventral spine. Basis similar to that of pereopod 3, with pinnate setae anteriorly. Segments from merus to propod becoming shorter and slenderer in a order. Merus longer than that of

pereopod 3, slightly swelling, provided with 1 posterodistal spine. Propod as long as carpus, provided with 2 long, stiff setae anterodistally, other long setae curled apically. Dactyl about half as long as propod, hooded.

Pereopod 5. Basis prominently larger than that of pereopod 4, most expanded basally, provided with many stiff setae on the anterior margin from expanding angle

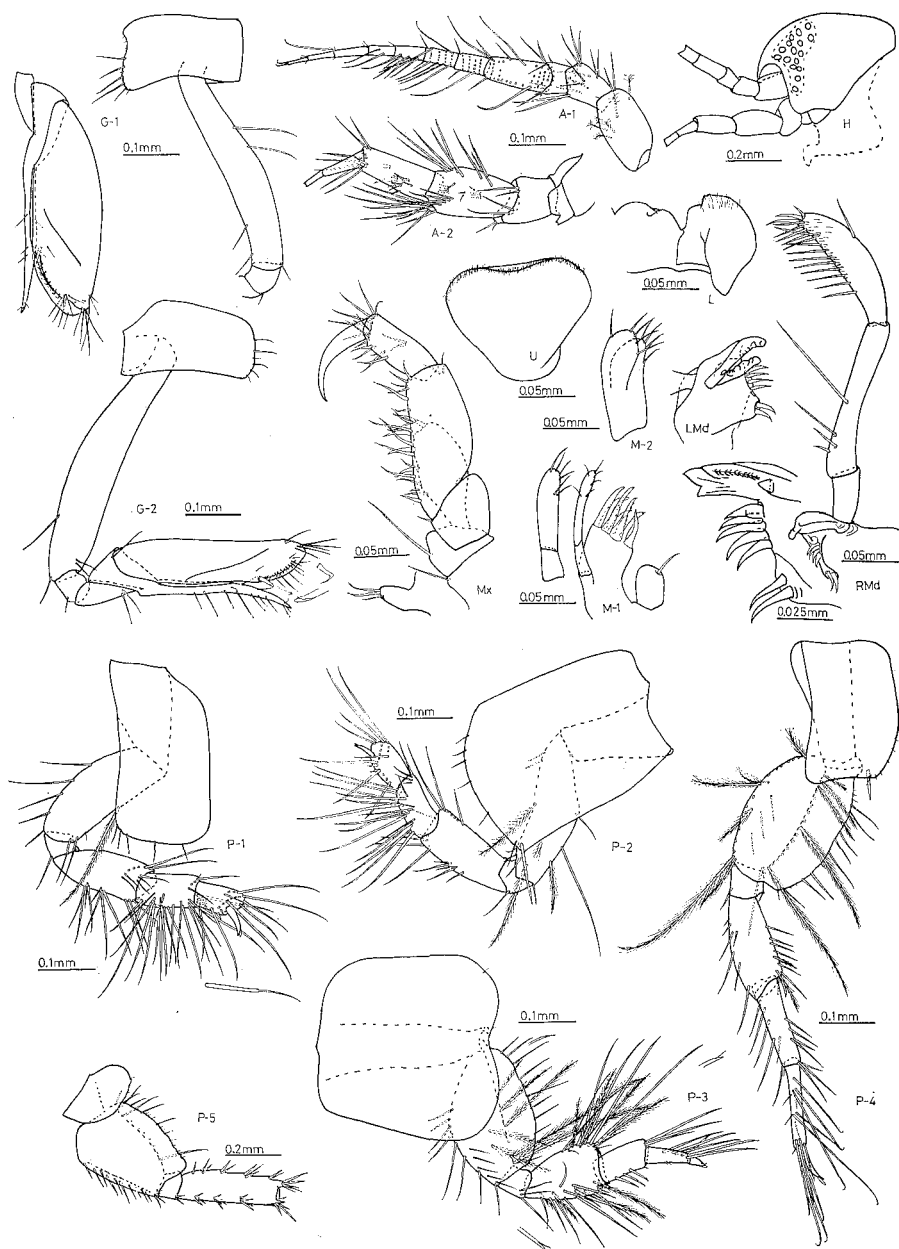


Fig. 237. *Periculodes pinguis* sp. nov. Holotype, female, 2.5 mm.

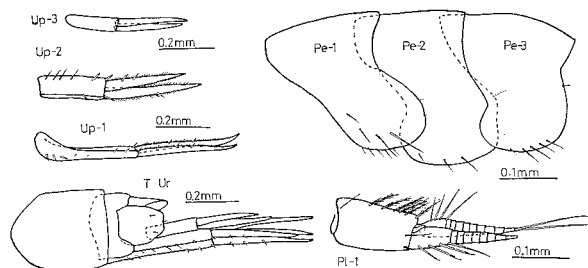


Fig. 238. *Perioculodes pinguis* sp. nov. Holotype, female, 2.5 mm.

to end. Ischium armed with 1 pair of spines anterodistally. Merus as long as basis, uniform in width, spinose marginally.

Pleopods. Stout, shortened; peduncle especially stout, shorter than rami, provided with 6 outer short pinnate setae and 1 inner-distal pair of coupling spines; proximal segment of inner ramus provided with 3 bifid and 1 simple setae; terminal swimming setae $2/3$ times as long as rami.

Uropods. Uropod 1 slightly or not extending beyond the end of uropod 2; peduncle as long as rami, provided with 3 spines outer-proximally; rami equal in length, slender, finely pectinate marginally; outer ramus with 3 spines; inner ramus with 2 spines. Uropod 2 $3/4$ the length of uropod 1; peduncle shorter than inner ramus, with 2 inner and 2 outer-distal spines and 4 outer-proximal small setae; rami finely pectinate; inner ramus distinctly shorter than outer ramus, provided with 2 inner spines; outer ramus with 1 outer spine. Uropod 3 $2/3$ times as long as uropod 2, naked; peduncle shorter than inner ramus; inner ramus a little shorter than outer ramus.

Telson. Directly connected with urosomite 2, entire, truncate, provided with 1 minute seta midterminally, together with 2 confronting minute setae on a point at distal a third the length.

Material examined. Holotype: Female, 2.5 mm. Type locality: Tomioka Bay. Date: May, 1978. Paratypes: 3 specimens. Collection No.: AMBL-Amph. 95.

Remarks. The new species is similar to *Perioculodes acuticoxa* Ledoyer, 1973 (Ledoyer 1973c) in the following characteristics: the rostrum reaching the end of peduncular segment 1 of antenna 1; gnathopods 1–2 slender, their carpus lobe extending beyond the end of propod; dactyls of pereopods 1–2 small; the molar provided with 2 stout teeth. However, the new species is discernible from *P. acuticoxa* by the following points: in *P. acuticoxa*, the segment 2 of mandibular palp broadly expanded; palms of gnathopods 1–2 almost transverse against the propod though oblique in the new species; the anteroventral angle of coxa 3 taper and slightly protruded.

Moreover, the new species is clearly distinguished from the other species in *Perioculodes* as follows; in *P. logimanus* (Bate et Westwood, 1868) (Lincoln 1979, Ledoyer 1973c, Sars 1895), *P. serra* Walker, 1904 (Ledoyer 1979) and *P. megapleon*

(Giles, 1888) (Ledoyer 1973c and 1979), the rostrum not extending beyond the middle of the peduncular segment 1 of antenna 1 in contrast to the counterpart in the new species which reaches the end of segment 1; in *P. aequimanus* (Kossmann, 1880) (Schellenberg 1928, Ledoyer 1972), the telson taper, and the coxa 1 prominently extended posteroventrally; in *P. pallidus* Griffiths, 1975 (Griffiths 1975), eyes absent, the lower lip lacking inner plates, and the terminal segment of mandible palp reduced and provided with only 3 apical setae; in *P. longirostratus* (the present paper), the dactyl of pereopods 1–2 elongate, the basal triangular part of carpus in the gnathopods 1–2 prominently longer than the counterpart in the new species, and the segment 3 of mandibular palp reduced and provided with 3 apical setae.

Pontocrates

Pontocrates altamarinus (Bate et Westwood, 1862)

(Fig. 239)

Pontocrates altamarinus (Bate et Westwood, 1862): Sars 1895, p. 695–696; Stebbing 1906, p. 240; Nagata 1960, p. 120; 1965a, p. 168–169; Hamond 1967, p. 125.

Material examined: Shijiki Bay.

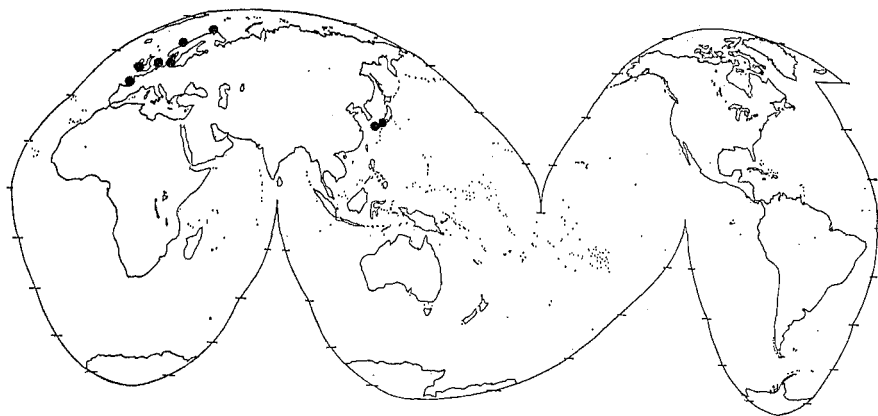


Fig. 239. Distribution of *Pontocrates altamarinus* (Bate & Westwood) (●) in the world.

Synchelidium

Synchelidium rostriopiculum sp. nov.

(Figs 240–243)

Body. Slender, depressed. Head horizontally and prominently protruded beyond peduncular segment 1 of antenna 1, rounded at forehead, subequal to pereonites 1–4 combined in length; superior antennal sinus deeply concave to the middle of head, prominently protruded forward ventrally; rostrum vestigial, tooth-like. Eyes semioval, standing on the terminal part of head. Pereon uneven dorsally.

Pleonal epimera rounded; epimeron 1 extended backward, setaceous ventrally; epimeron 2 protruded midanteriorly, provided with 1 central oblique row of setae, setaceous posteriorly; epimeron 3 setaceous posteriorly. Urosome slender; urosomite 1 armed with 1 spine on a posteroventral angle of its lateral sides.

Antennae. Antenna 1 subequal to head and pereonite 1 combined in length; peduncular segment 1 setaceous, $3/4$ the length of peduncular segment 2; distal small extension of peduncular segments 2–3 provided with 1 apical seta of which apical half is pinnate; peduncular segment 2 about half the length of peduncular segment 2; accessory flagellum absent; main flagellum consisting of 7 segments; segments 4–6 each provided with 1 distal aesthetasc. Antenna 2: peduncular segment 2 scale-like, its gland cone stout and short; peduncular segment 3 pronouncedly protruded ventrally; peduncular segment 4 twice as long as segment 3, setaceous, provided with 1 distal pair of long setae of which the apical half is pinnate.

Mouthparts. Upper lip rounded. Lower lip: inner plates completely coalescent with each other, broad; outer plate astride on inner plates, densely pubescent; shoulders broad, provided with 1 conical tooth on its inner side, mandibular process medium. Maxilla 1: inner plate rather large, subtriangular, provided with 1 apical pinnate seta; outer plate with 2 large, 3 serrate or pectinate and 3 smaller tooth-like spines, one of the large spines armed with 1 spine, the 3 smaller spines with 1 tooth; palp consisting of 2 segments; the proximal one short; the terminal one rounded apically, crenulate on its distal a third of length which is armed with 7 stiff setae on the inner margin, and 1 tooth, 2 stout spines and 1 stiff seta on apex, together with one diagonal row of 5 stiff setae on the upper side. Maxilla 2: inner plate obliquely truncate, provided with 6 thick unplumose and 1 plumose setae, and several small setae; outer plate provided with 1 longitudinal row of 11 setae on outer and apical margins and 1 longitudinal row of 4 setae on inner margin. Mandible: incisor provided with 1 acute tooth on both outer sides; lacinia mobilis broad, serrate in left mandible, though pectinate in right mandible; accessory teeth 3 in number and pectinate in both mandibles, furnished with a slender pinnate tooth in the left mandible; molar process pseudotriturative, provided with 2 apical serrate teeth, one of which is bifid; palp consisting of three segments, well developed; palp segments 2–3 equal in length, spinose in two longitudinal rows, one of which includes several elongate setae; palp segment 3 comb-like, provided with 1 stout apical and 2 outer setae. Maxilliped: inner plate rather small, provided with 1 spine and several setae apically; outer plate reaching apical a quarter the length of palp segment 2, with 15 slender teeth on inner margin and 3 setae on outer side of apical margin; palp consisting of four segments, rather slender; palp segment 2 occupying about half the length of palp, setaceous on the inner side; palp segment 3 compressed proximally, truncate, provided with 1 diagonal row of setae on its upper side; dactyl falcate, as long as palp segment 3, slender, with a nail.

Gnathopod 1. Slender, chelate. Coxa 1 slightly expanded and rounded ventrally, with 3 spines posteriorly. Basis slightly longer than carpus and propod combined. Merus $1/4$ times as long as basis, attenuate, fitting on a concavity of carpus.

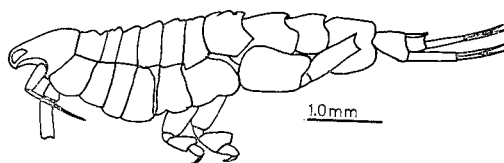


Fig. 240. *Synchelidium rostriopiculum* sp. nov. Holotype, female, 6.0 mm.

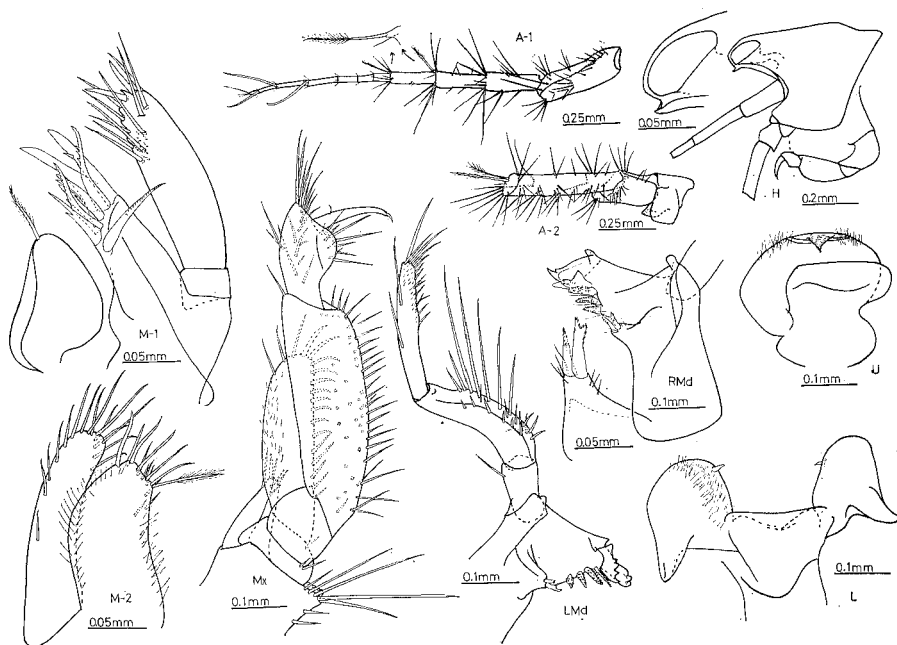


Fig. 241. *Synchelidium rostriopiculum* sp. nov. Holotype, female, 6.0 mm.

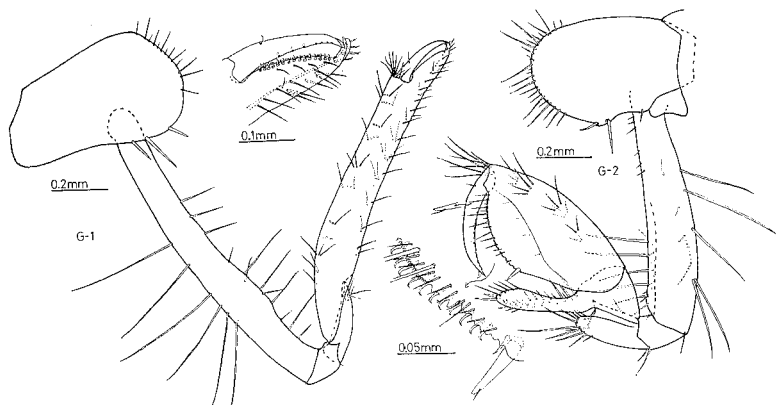


Fig. 242. *Synchelidium rostriopiculum* sp. nov. Holotype, female, 6.0 mm.

Carpus and propod completely coalescent, almost contacting with ischium, distal coalescent scar visible; posterodistal extension directed upward beyond dactyl, hooded, provided with 4 spines; palp finely pubescent, with many minute setae. Dactyl scimitar, reaching the inner side of posterior extension of propod, hooded; grasping margin provided with 7 pit organs.

Gnathopod 2. Subchelate. Coxa 2 shallower than coxa 1, rounded and setaceous ventrally, provided with 1 spine posteroproximally; a posteromedial expansion

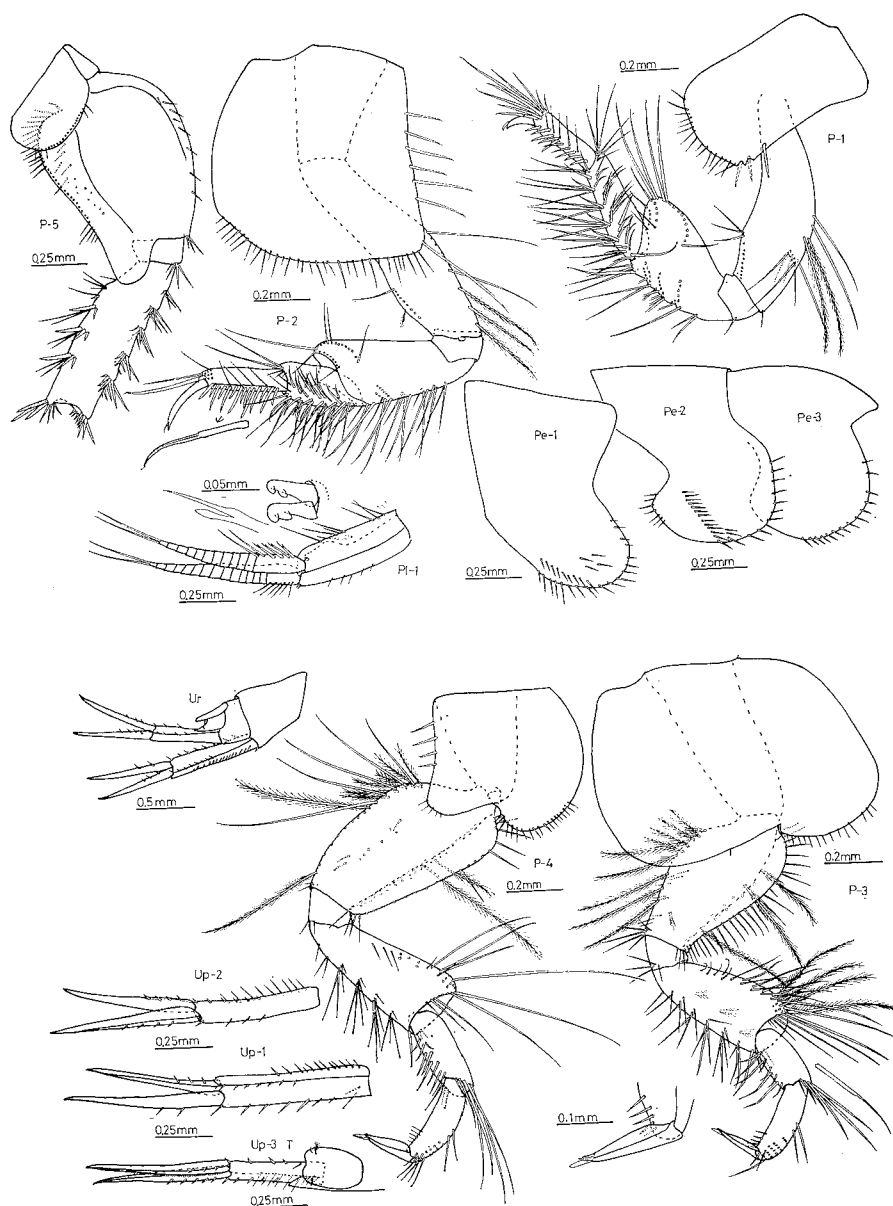


Fig. 243. *Synchelidium rostriopiculum* sp. nov. Holotype, female, 6.0 mm.

small, provided with 2 basal spines. Merus protruded and rounded posterodistally; this posterior extension setaceous marginally. Carpus: basal triangular part shorter than merus, contacting with ischium; posterior lobe stout, extending beyond a palm-defining spine, provided with 2 apical spines and 1 longitudinal row of paired and single short setae on inner side. Propod $3/4$ times as long as basis, nearly oblong, most expanded at the middle; palm oblique, reaching the middle of propod, gently expanded, defined by 1 spine, crenulate on posterior a third of its width and finely serrate on the rest, with many hooked setae on the inner side. Dactyl falcate, overlapping on palm when closed, hooded; grasping margin provided with many pit organs.

Pereopods 1-2. Similar, stout. Coxa 3 rectangular, provided with 3 spines posteroventrally. Coxa 4 subsquare, perpendicular on its posterior margin, with long and short stiff setae posteriorly. Basis slightly dilated at apical a third of its length, provided with a longitudinal row of setae along margin from the expansion to the end. Merus gradually expanded forward and extended almost to the middle of carpus anteriorly, setaceous in transverse rows posteriorly. Carpus provided with about 6 thick and slender setae of different length. Propod subequal to carpus in length, provided with 1 longitudinal row of many sword-like spines on whole of posterior margin, together with many long spines anterodistally. Dactyl falcate, about $3/4$ the propod length, hooded.

Pereopods 3-4. Similar to each other, though the latter a little longer than the former. Coxae 5-6 bilobate; anterior lobe rounded, with many stiff setae ventrally; posterior lobe of coxa 6 perpendicular posteriorly, provided with 4 spines posteriorly, about twice as broad as the anterior one. Relative lengths of segments from basis to dactyl almost 8.0:1.5:6.5:4.0:4.0:2.5. Basis most expanded basally; muscular part provided with many pinnate setae of different lengths marginally; posterior thin plate not extended forward, gradually decreasing in width, provided with many short stiff setae marginally. Merus gradually increasing in thickness, not extended posterodistally. Carpus provided with 2 anterior longitudinal rows of thick setae and many posterodistal short and long setae of which basal half is stout. Propod as long as carpus, provided with 5 minute setae along apical a quarter of the anterior margin and many short setae arranged in rows on apical half of posterior margin. Dactyl longer than half of the propod length, hooded, with a nail; the anterior side even.

Pereopod 5. Coxa 7 provided with many short setae ventrally. Basis larger than that of pereopod 6; posterior thin plate uniform in width, extending far beyond ischium, with many short setae on proximal $2/3$ of posterior margin. Merus as long as basis, spinose. Other segments unknown.

Pleopods. Stout. Pleopod 1: peduncle shorter than rami, setaceous posteriorly; rami stout; proximal segment of inner ramus provided with 4 bifid and 2 simple setae; terminal swimming setae half as long as rami.

Uropods. Similar in form, gradually shortening in a order; rami awl-shaped; outer ramus a little shorter than inner ramus.

Telson. Oval, emarginate distally, 1.5 times as long as wide, provided with 2 confronting sets of 1 pinnate and 1 unpinnate setae.

Material examined. Holotype: Female, 6.0 mm. Type locality: Off west coast of Tomioka. Date: May, 1979. Paratype: 1 specimen. Collection No.: AMBL-Amph. 111.

Remarks. The head of the present species is horizontally projected forward and is not decurved like galeate, and its rostrum is minute. This head type is not known in any other species of *Synchelidium* to date. However, the present species has the elongate dactyl on the pereopods 1-2 and such dactyls are formerly observed in only two species, *Synchelidium miraculum* Imbach, 1967 (Imbach 1967) and *S. longidigitatum* Ruffo, 1947 (Imbach 1967). This fact suggests the close relation between the present species and above two species. Moreover, the present species is more closely related to *S. miraculum* from East China Sea than to *S. longidigitatum* from the Mediterranean in the following characteristics: the basis of pereopod 5 prominently protruded posterodistally; a form and a number of spines and setae in mandible palp; elongate and stouter merus in the pereopods 1-4; shape of carpus and propod in the gnathopod 2.

The inner plates of lower lip are completely fused with each other in the present species. Such lower lip is known in only *S. micropoleon* J.L. Barnard, 1977 (J.L. Barnard 1977) but above-mentioned characteristics are not observed in this species. In this species, further, the body is lobust and the peduncle of uropod 3 is shortened, though the new species is slender and has the elongate peduncle of uropod 3.

Philantidae

Key to the genera of Philantidae

- | | | |
|---|--|----------------------|
| 1 | Palp of maxilliped triarticulate | <i>Palinnotus</i> |
| | Palp of maxilliped 4-articulate | <i>Heterophilias</i> |

Palinnotus

Palinnotus thomsoni (Stebbing, 1899) ***japonicus*** subsp. nov.

(Figs 244-246)

Body. Depressed, ridged and tuberos on back of pleon and pereon; pereonites gradually deepened in a order. Head shorter than pereonite 1, subtriangular in a lateral view; rostrum short, triangular; anterior head lobe prominently protruded at upper level of head, rounded anteriorly, with eyes. Eyes small, circular. Pleonites gradually shortening, densely bristly; epimera weakly developed, subrectangular, gradually decreasing in width. Urosomites 2-3 shortened; urosomite 3 concealed beneath urosomite 2 and telson.

Antennae. Very short. Antenna 1 stout, lacking accessory flagellum; pedun-

cular segment 1 the stoutest, compressed proximally, provided with 6 inner-distal pinnate setae; peduncular segment 2 half as broad as segment 1; peduncular segment 3 about $2/3$ times as long as segment 2, a little decreasing in thickness; accessory flagellum absent; main flagellum uniarticulate, rudimentary, provided with 9 aesthetascs and 6 small setae apically. Antenna 2 feeble, shorter than antenna 1; peduncular segment 2 lacking gland cone; peduncular segments 3-4 gradually increasing in length; flagellum biarticulate, the terminal segment vestigial, with many setae apically.

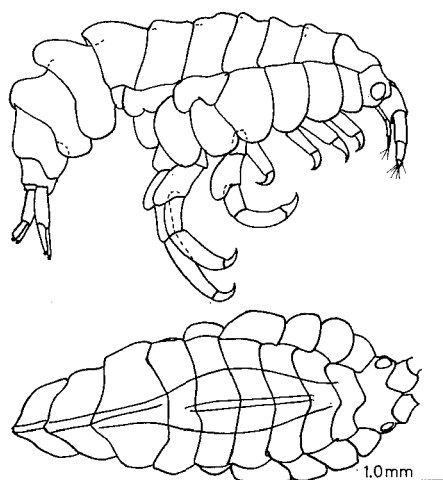


Fig. 244. *Palinnotus thomsoni japonicus* subsp. nov. Holotype, male, 7.0 mm.

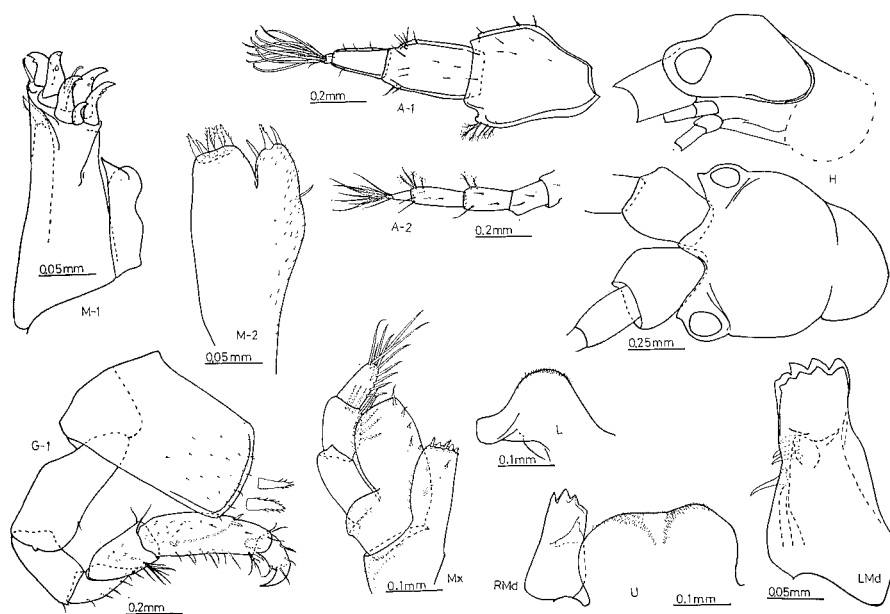


Fig. 245. *Palinnotus thomsoni japonicus* subsp. nov. Holotype, male, 7.0 mm.

Mouthparts. Prominently compressed, attaching on a ventroproximal part of head. Upper lip well developed, broad. Lower lip lacking inner plate; shoulders broad, densely pubescent; molar process medium. Maxilla 1: inner plate large, provided with an apical triangular process, unarmed; outer plate stout, provided with 5 stout and 1 smaller tooth-like spines, together with 2 thick setae, the stout spines armed with 1 to 3 conical teeth; palp hump well developed; palp uniarticulate, small, falcate, pubescent. Maxilla 2: both inner and outer plates coalescent in greater part, divided by a notch; inner plate broader than outer plate, provided with 5 apical teeth, four of which are serrate; outer plate provided with 3 apical teeth, one of which is serrate. Mandible equal to the outer plate of maxilla 1 in size, lacking palp, lacinia mobilis and molar process, provided with 1 stout tooth instead of molar process; incisor distinctly serrate; accessory teeth 3 in number, growing on a small protuberance. Maxilliped weakly developed; inner plate medium, truncate, with 3 small conical and 2 small serrate teeth apically; outer plate broad, reaching near the end of palp segment 2, provided with 7 small inner setae; palp consisting of 3 segments, rather slender, gradually shortening; palp segments 2-3 provided with short pectinate setae on inner margin; palp segment 3 truncate, with 5 unpectinate setae apically.

Gnathopods 1-2. Simple, similar to each other, also similar to pereopods 1-2. Coxa 1 rectangular; anterior and ventral margins of coxa 2 continuously rounded. Ischium about $3/4$ times as long as basis. Merus extending to the middle of carpus ventrally. Carpus a little shorter than merus, provided with 1 transverse row of several short setae posterodistally. Propod a little longer than ischium, provided with 1 locking spine, together with 1 diagonal row of 14 small serrate spines on the inner side of gnathopod 1, though lacking its row in the gnathopod 2. Dactyl about half the basis length, stout; its distal part nail-like.

Pereopods 1-2. Similar to gnathopod 2 except for the following points: merus prominently expanded and extended anteriorly; carpus normally connecting with merus, its proximal half triangular. Coxa 3 similar to coxa 2; coxa 4 expanded backward at basal a third the depth.

Pereopods 3-5. Similar to each other except for coxae and basis. Coxae 5-6 bilobate, the former deeper than the latter; coxa 7 absent or coalescent into pereonite 7. Relative anterior lengths from basis to dactyl 5.0:3.5:3.0:3.5:5.5:2.5 in pereopod 3, 5.5:4.0:3.5:4.5:6.5:2.5 in pereopods 4-5. Bases in pereopods 3-4 broadly expanded in a semicircle and not extended beyond ischium; in pereopod 5 subrectangular, slightly expanded and not protruded posteriorly. Carpus lacking an anterodistal spine in pereopod 3, though armed with 1 anterodistal spine in pereopods 4-5. Locking spine on propod only one in number.

Pleopods. Peduncle provided with 2 coupling spines in pleopods 1-2, and with 3 coupling spines in pleopod 3. Pleopod 3: peduncle short, prominently expanded inward, protruded inner-distally; rami stout, elongate, their proximal segments coalescent, well developed; outer ramus longer than inner ramus; terminal swimming setae longer than rami.

Uropods. Uropod 1 extending beyond uropod 2; peduncle a little swelling, longer than rami, provided with 4 short inner-distal setae; rami equal in length, clavate, provided with 1 conical spine and several small setae apically. Uropod 2 a little shorter than uropod 1; peduncle as long as that of uropod 1, provided with 1 large triangular expansion inner-medially; rami equal in length, clavate, provided

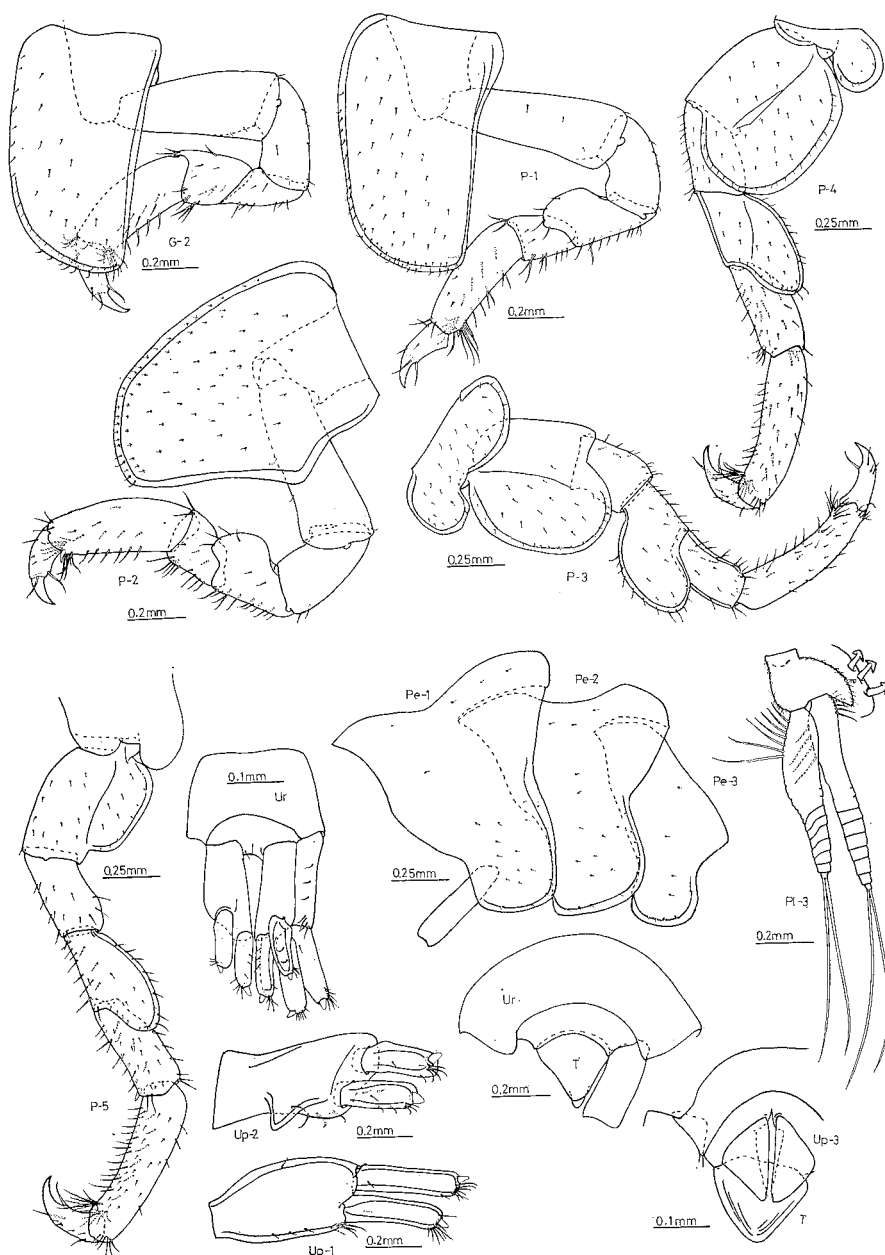


Fig. 246. *Palinotus thomsoni japonicus* subsp. nov. Holotype, male, 7.0 mm.

with 1 conical spine and several small setae apically. Uropod 3 lacking rami, triangular, with 1 minute seta inner-distally.

Telson. Small, fleshy, triangular, unarmed.

Material examined. Holotype: Male, 7.0 mm. Type locality: Tomioka Bay. Date: May, 1978. Paratypes: 6 specimens. Collection No.: AMBL-Amph. 98.

Remarks. The present specimens agree well with the description and figures of *Palinnotus thomsoni* (Stebbing, 1899) by J.L. Barnard (1972a) that has been recorded only from Australia, but the following differences are found between them: in *P. thomsoni*, 1) the propod of gnathopod 1 less spinous than the counterpart in the present specimens, 2) the coxa 4 prominently extended posteromedially, 3) the peduncle of uropod 2 lacking a inner triangular expansion, 4) the inner plate of maxilla 1 prominently smaller than that of the present specimens, 5) a distal protrusion of peduncular segment 1 of antenna 1 more pronounced than the counterpart in the present specimens, and 6) protrusions on head, pereon and pleon more developed than in the present specimens. As these differences, I think, are not essential to separating the present specimens from *P. thomsoni* in species level, these Japanese specimens are nominated for the new subspecies, *Palinnotus thomsoni* (Stebbing, 1899) *japonicus*.

Heterophilias

Heterophilias lepas sp. nov.

(Figs 247–249)

Body. Completely depressed as a sedge hat; pereon not tuberos on back; pereonites 2–3 and urosome usually folded beneath pleonite 1 and pereonite 7, prominently depressed. Head not extending beyond coxa 1; complex of head and antenna 1 rectangular; rostrum short, triangular; anterior head lobe reaching the end of rostrum, provided with a pair of 1 sensory seta and 1 gland organ on a ventromedial part. Eyes circular, located on the anterior head lobe, dark on a central part in alcohol. Pleonite 1 pentagonal, rising posteriorly, undulate on back; pleonal epimeron 1 small, rounded ventrally; pleonites 2–3 subequal in length, lacking epimera; pleonite 2 prominently extended upward above an anterior half of pleonite 3; back of pleonite 3 gradually rising toward the middle. Urosomites 2–3 coalescent.

Antennae. Antenna 1 very short, triangular because of the peduncular segments 1–2 prominently expanded outward, lacking accessory flagellum; peduncular segments gradually decreasing in size; expansion of peduncular segment 1 rectangular, prominent; expansion of peduncular segment 2 extending near distal end of peduncular segment 3, provided with 1 distal spine; main flagellum consisting of two segments, 2/3 times as long as peduncular segment 3; flagellum segment 1 provided with many aesthetascs. Antenna 2 a little longer than antenna 1; peduncular segments 1–2 undefined; peduncular segment 4 longer than twice as long as segment 3, gradually

increasing in width; peduncular segment 5 a little swollen; flagellum consisting of two segments, about $2/3$ times as long as peduncular segment 5; terminal segment of flagellum very small.

Mouthparts. Not massive, attached on the ventroproximal part of head. Upper lip semicircular, provided with 2 confronting pubescent patches. Lower lip broadly expanded, lacking inner plates; shoulders rectangular, broad, provided with 1 spine-like tooth; mandibular process broad. Maxilla 1: inner plate unknown; outer plate lacking palp, with a triangular expansion medially, provided with 5 tooth-like, stout spines which are armed with 1 tooth. Maxilla 2: both plates almost coalescent, rectangular apically; inner plate narrow, provided with 4 small stiff setae apically; outer plate with 9 serrate teeth, two of which are broadly expanded distally. Mandible almost uniform in width, lacking lacinia mobilis and molar process; incisor projected forward, with 5 acute teeth; accessory blades 3 in number, growing on a small cylindrical process which sites on an acute triangular plate; palp uniarticulate, clavate, provided with 1 pinnate seta apically. Maxilliped: inner plate medium, with 1 outer acute tooth and 4 conical spines apically; outer plate not reaching distal end of palp segment 2, broad, provided with 10 inner small setae; palp slender, consisting of four segments; palp segments 1-2 equal in length; palp segment 3 shorter than palp segment 2; palp segment 4 small, truncate, provided with 1 long apical seta of which an apical half is pectinate.

Gnathopods 1-2. Simple, similar. Coxa 1 gradually extending forward, its anterior margin half as long as posterior one; coxa 2 rectangular, a little broadened ventrally. Segments from ischium to carpus subequal in posterior length. Carpus provided with many spines along inner margin of distal a third the length, its antero-distal end with several spines. Propod longer than carpus, provided with only 1 locking spine; its proximal half in gnathopod 1 provided with 1 longitudinal row of 5 serrate spines on its inner side, pectinate and provided with 1 distal spine on its anterior margin. Dactyl falcate, its distal half nail-like.

Pereopods 1-2. Similar to gnathopod 2 except for the merus, stouter than the latter. Coxa 3 similar to coxa 2. Coxa 4 strongly excavate at proximal a third of

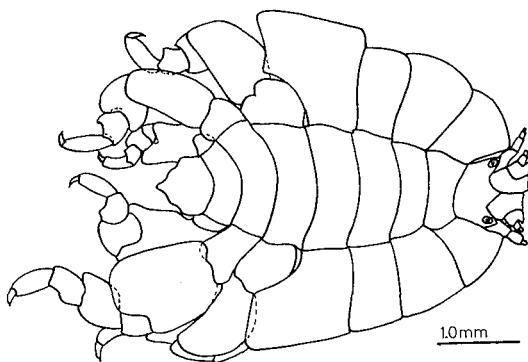


Fig. 247. *Heterophilias lepas* sp. nov. Holotype, male, 4.75 mm.

the hind margin. Merus gradually and prominently expanding forward, a little extending anteriorly, its posterior length subequal to carpus length. Locking spines on propod only one in number.

Pereopods 3-4. Closely similar to each other in form, though pereopods 3-4 stouter than pereopod 5. Coxae 5-7 bilobate, gradually decreasing in size. Basis

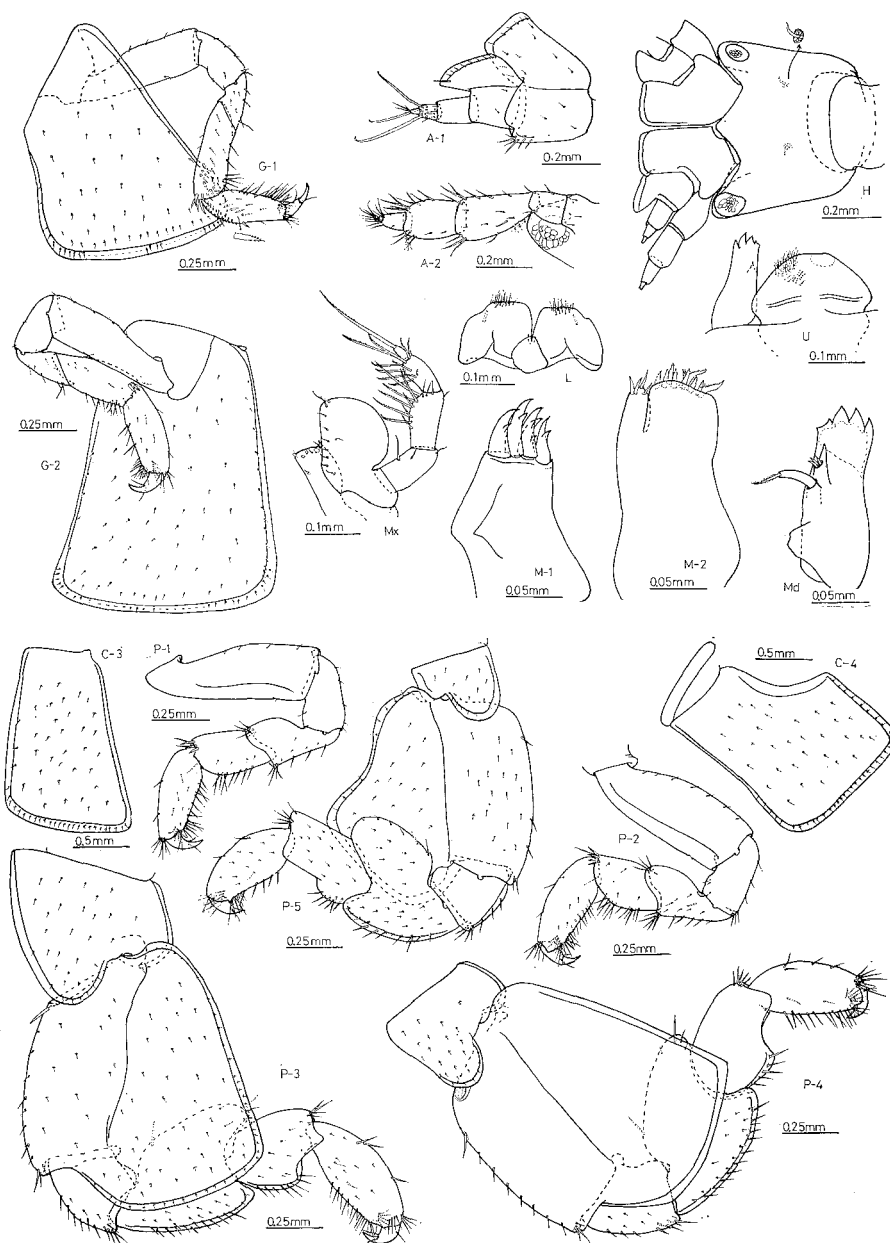


Fig. 248. *Heterophilias lepas* sp. nov. Holotype, male, 4.75 mm.

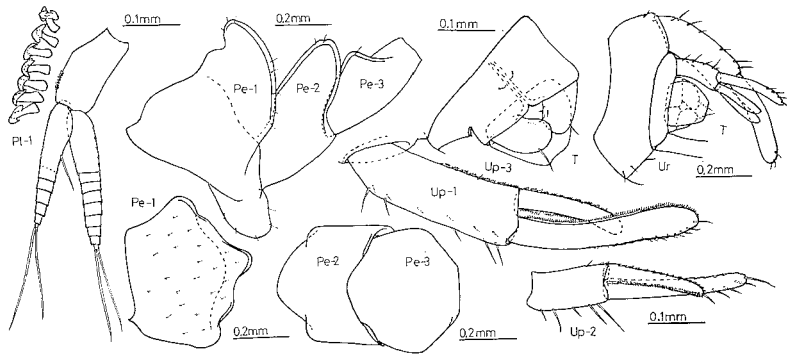


Fig. 249. *Heterophilias lepas* sp. nov. Holotype, male, 4.75 mm.

prominently winged backward in a rectangle, though gently concave posteriorly in pereopod 5; its anterodistal angle in pereopods 3-4 provided with 1 spine, though lacking its spine in pereopod 5. Merus gradually expanding backward, the posterior extension more prominent than the anterior one. Distal half the anterior length of carpus deeply concave. Propod and dactyl similar to those of the pereopod 2; locking spine of the propod only one in number.

Pleopods. Pleopods 1-2 similar to each other; peduncle $2/3$ times as long as inner ramus, provided with 1 longitudinal row of 8 anchor-formed coupling spines inner-distally; outer ramus longer than inner ramus; proximal segment of both rami elongate; terminal swimming setae shorter than inner ramus. Pleopod 3: peduncle small, provided with 1 clavate extension inner-distally which is armed with 3 coupling spines; rami similar to those of pleopod 1.

Uropods. Uropod 1 extending far beyond uropod 2, rather slender; peduncle subequal to outer ramus in length, finely serrate along distal $2/3$ the inner margin; rami clavate, rounded apically; outer ramus finely serrate along inner margin, provided with 8 small setae on distal half of outer margin; inner ramus about $2/3$ times as long as outer ramus, finely serrate along both outer and inner margins. Uropod 2: peduncle half as long as outer ramus; rami similar to those of uropod 1 in form. Uropod 3 very small, lacking rami, rounded apically, provided with 1 outer-distal short seta and 2 inner-medial small setae.

Telson. Trapezoid, truncate, unarmed.

Material examined. Holotype: Male, 4.75 mm. Type locality: Tomioka Bay. Date: May, 1978. Paratype: 1 specimen. Collection No.: AMBL-Amph. 99.

Remarks. In the genus *Heterophilias*, the anterior part of head forms a broad and rectangular shield together with the rostrum of head and the peduncle of antenna 1, but the formation of this shield is different between the present species and all of other congeneric species. In the present species, the rostrum is triangular and is rather reduced against the peduncular segments 1-2 of antenna 1 which are well developed inward. On the other hand, all of the other species have the rostrum which is prominently extended and expanded in a rectangle, and their peduncular

segments 1–2 lack the inner expansions. Thus, the present species is clearly distinguished from all of the other species of the *Heterophilias* by the above characteristics in the head and antenna 1.

Phoxocephalidae

Key to the genera of Phoxocephalidae

- | | | |
|---|--|----------------------|
| 1 | Basis of pereopod 3 not expanded; eyes absent | <i>Harpiniopsis</i> |
| | Basis of pereopod 3 broadly expanded; eyes present | 2 |
| 2 | Palp of maxilla 1 biarticulate..... | <i>Paraphoxus</i> |
| | Palp of maxilla 1 uniarticulate | 3 |
| 3 | Gnathopods 1–2 different | <i>Phoxocephalus</i> |
| | Gnathopods 1–2 alike | <i>Metaphoxus</i> |

Harpiniopsis

Harpiniopsis vadicular sp. nov.

(Figs 250–252)

Body. Fusiform. Head: rostrum extended almost straight, overhanging the greater part of antenna 1; antennal sinus concave to the middle of head; anteroventral tooth acute. Eyes absent. Pleonal epimeron 1 half as broad as epimeron 2, protruded ventromedially, provided with 4 pinnate setae on the ventral ridge; pleonal epimeron 2 rectangular, provided with 3 small setae ventrally; pleonal epimeron 3 equal to epimeron 2 in width, its posteroventral tooth stout and upturned, armed with 1 upper-proximal seta. Urosomite 1 slightly concave dorsomedially, provided with 2 confronting spines.

Antennae. Antennae shorter than head length. Antenna 1: peduncular segment 1 stout, provided with 3 ventrodistal setae of which distal part is pinnate; peduncular segment 2 half the length of segment 1, with 4 long setae ventrodistally; peduncular segment 3 $2\frac{2}{3}$ times as long as segment 2, with 1 long seta ventrodistally; the long setae of the peduncle dispersively pinnate; accessory flagellum 4-articulate, as long as peduncular segments 2–3 combined; main flagellum 5-articulate. Antenna 2: peduncular segment 1 weakly ensiform, lying on the ventral margin of peduncular segment 2; peduncular segment 4 as long as peduncular segment 3, gradually expanding ventrally, provided with many stiff setae anterodistally, its ventral expansion provided with 4 long, dispersively pinnate setae and 2 distal spines ventrally; peduncular segment 5 a little shorter than segment 4, obliquely truncate, with 1 spine and 6 dispersively pinnate setae distally; flagellum consisting of four segments; flagellum segments 1–3 protruded ventrodistally; flagellum segment 1 elongate.

Mouthparts. Upper lip protruded apicomediaally. Lower lip: shoulders triangular, obtusa; mandibular process medium. Maxilla 1: inner plate rather small,

triangular, unarmed; outer plate provided with 6 tooth-like spines, two of which are bifid apically; palp consisting of two segments, the distal segment about half as long as the proximal one, rounded apically, provided with 4 small setae. Maxilla 2: inner plate armed with 3 setae, two of which are pinnate; outer plate with 6 unpinnate setae. Mandible small, slender, provided with palp outerdistally; incisor and lacinia mobilis 4- or 5-toothed; accessory spines conical, 3 in number; molar process vestigial, provided with 3 small setae; palper hump well protruded; palp consisting of 3 segments, elongate; palp segments 2-3 subequal in length, provided with 3 pairs of setae only on the segment 3 apically. Maxilliped small, slender; inner plate armed with 3 pinnate setae apically; outer plate triangular, a little extending beyond palp segment 1, provided with 5 inner-marginal spines; palp consisting of four segments, first three of which are subequal in length; palp segments 2-3 slightly swollen; palp segment 4 small, provided with 1 longer seta apically.

Gnathopods 1-2. Subchelate, similar to each other. Coxae 1-2 notched posteroventrally. Basis and ischium provided with 1 dispersively pinnate seta posterodistally. Carpus triangular, not touching ischium. Propod subequal to basis in length, oblong, most expanded at the middle; palm almost parallel to longitudinal axis, defined by 1 spine and a notch.

Pereopods 1-2. Similar to each other except for coxae and dactyl. Coxa 3 similar to coxa 2; coxa 4 prominently excavate proximally on the hind margin, L-formed. Relative posterior lengths of segments from basis to propod 8.0-7.0:1.5:4.0-5.0:2.5:2.7. Basis provided with 4 long unpinnate and 1 distal dispersively pinnate setae on distal 1/3 the posterior margin; these unpinnate setae in pereopod 2 pectinate on each distal part. Merus: anterodistal extension truncate, small, provided with 2 dispersively setae apically. Carpus posteriorly provided with 2 distal spines and 2 medial dispersively pinnate setae of which are stout and long. Propod: locking spines paired, not extending beyond the dactyl. Dactyl in pereopod 1 spine-like, 2/3 times as long as propod, bifid apically, provided with 1 minute tooth posterodistally; in pereopod 2, subequal to propod in length, with a nail apically of which the base is armed with 1 spine posteriorly.

Pereopod 3. Shorter than pereopod 2, stout; short and long thick setae dispersively pinnate. Coxa 5 provided with 2 thick setae posteroventrally. Relative lengths of segments from basis to dactyl 5.5:1.3:3.3:3.0:3.5:1.9. Basis not winged, uniform in width, with 1 thick seta both distally. Ischium broader than long, with

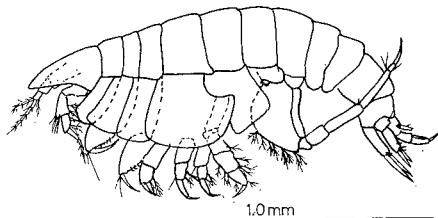


Fig. 250. *Harpiniopsis vadiculus* sp. nov. Holotype, female, 2.5 mm.

1 thick seta anterodistally. Merus, carpus and propod a little swollen, with long and short thick setae marginally; carpus with 1 spine posterodistally; propod lacking locking spines. Dactyl spine-like, stout.

Pereopod 4. Extending far beyond a tail when stretched. Basis most expanded forward at the middle, rounded anteriorly, provided with 3 sets of 1 stout spine and

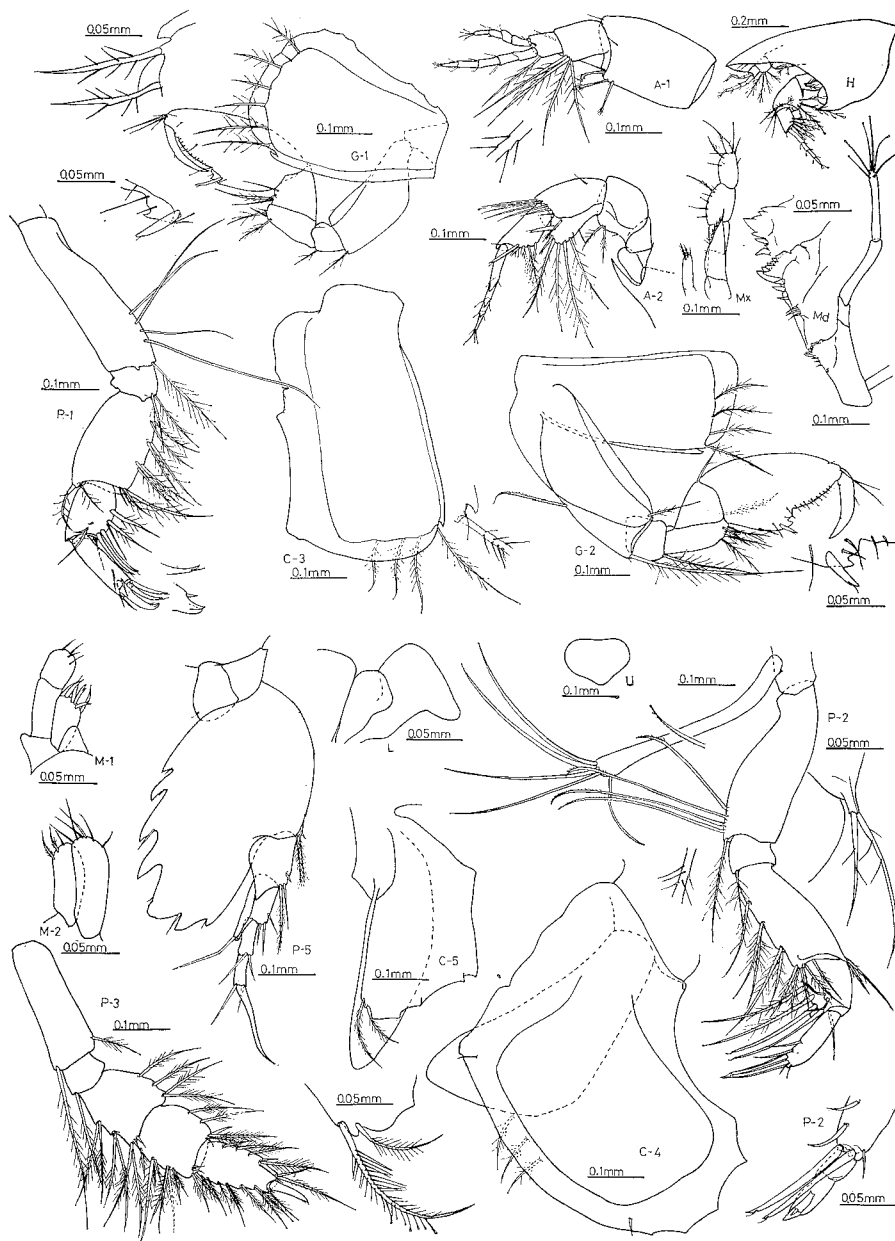


Fig. 251. *Harpiniopsis vadicalus* sp. nov. Holotype, female, 2.5 mm.

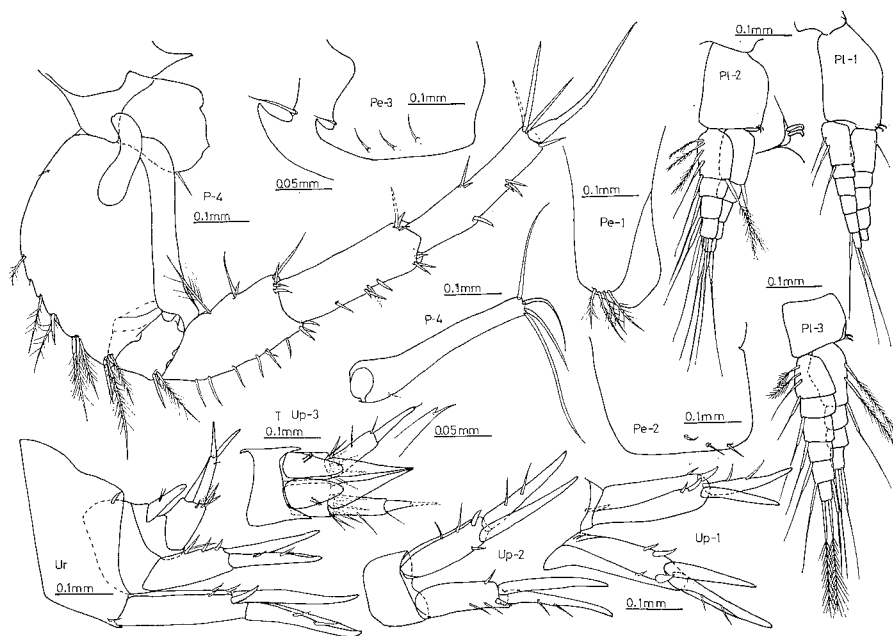


Fig. 252. *Harpiniopsis vadiculus* sp. nov. Holotype, female, 2.5 mm.

1 or 2 dispersively pinnate setae on distal 1/3 of anterior margin; posterior thin plate slender, uniform in width, extending to the end of ischium. Ischium prominently broader than long, provided with 1 set of 2 spines and 1 pinnate seta anterodistally. Segments from merus to dactyl equal in length, spinose; propod provided with 3 long spines posterodistally; dactyl lanceolate.

Pereopod 5. Coxa 7 small. Basis broadly expanded backward, extending to the end of merus, largely serrate posteriorly and ventrally, provided with 1 set of 1 small spine and 2 pinnate setae anterodistally. Ischium longer than wide, most expanded backward at its base, extending to the middle of merus, provided with 1 spine and 2 setae anterodistally, one seta of which is pinnate. Merus shorter than ischium in anterior length; the posterodistal extension extending a little beyond the middle of carpus, truncate, provided with 1 long unpinnate seta apically. Carpus and propod equal in size, with 2 unpinnate thick setae distally. Dactyl about 3 times as long as propod, lanceolate.

Pleopods. Stout; peduncles shortening in a order. Pleopod 3: peduncle broader than long, provided with 2 coupling spines which are hooked apically; rami 4- or 6-articulate; proximal part of swimming setae thick and unpinnate; the terminal swimming setae subequal to rami in length.

Uropods. Uropod 1 extending beyond uropod 2; peduncle longer than outer ramus, provided with 2 sets of 1 small and 1 stout spines upper-distally; rami attenuate, blunt apically; outer ramus longer than inner ramus, provided with 2 stiff setae outer-medially; inner ramus unarmed. Uropod 2 similar to uropod 1; peduncle provided with 1 thick spine outer-distally; rami equal in length; outer ramus with 2

setae outer-medially; inner ramus unarmed. Uropod 3 not extending beyond uropod 2; peduncle as long as proximal segment of outer ramus, provided with 6 spines or setae ventrodistally; outer ramus biarticulate, its terminal segment shorter than the proximal one, attenuate, bifid apically; inner ramus reaching the middle of terminal segment of inner ramus, attenuate, unarmed.

Telson. Completely divided; each lobe oblong, provided with 1 pair of pinnate setae outer-medially and 1 minute seta outer-distally.

Material examined. Holotype: Female, 2.5 mm. Type locality: Ariake Sea. Date: June 8, 1976. Paratypes: 4 specimens. Collection No.: AMBL-Amph. 13.

Remarks. The new species closely resembles *Harpiniopsis miharaensis* (Nagata, 1960), reported as *Harpinia miharaensis* Nagata, 1960, by Nagata (1960, 1965a) from Seto Inland Sea, in the pereopods, gnathopods and pleonal epimeron 3. However, the new species is clearly discernible from the latter in the shape of the telson; the telson of the new species is completely divided into two lobes, though the counterpart in *H. miharaensis* is fused proximally. Further, other differences are found between them: 1) the hood of *H. miharaensis* deeper than the counterpart in the new species in lateral view, 2) the ventral margin of hood provided with 1 projection medially in *H. miharaensis*, though the new species lacking it, and 3) the posterior expansion of basis on the pereopod 5 of *H. miharaensis* more prominent than that of the new species.

Paraphoxus

Key to the species of *Paraphoxus*

- 1 Molar process of mandible with 2 spines *P. oculatus*
- Molar process of mandible with 4 spines *P. tomiokaensis*

Paraphoxus oculatus (Sars, 1879)

(Fig. 253)

Phoxus oculatus Sars, 1879.

Paraphoxus oculatus (Sars, 1879): Walker 1895, p. 296; Sars 1895, p. 149-150; Stebbing 1906, p. 187-188; Stephensen 1938, p. 150; 1940a, p. 20; Gurjanova 1951, p. 364-365; Oldevig 1959, p. 38; J.L. Barnard 1960a, p. 240-243; 1967c, p. 138; 1971b, p. 70; Nagata 1965a, p. 156; Karaman 1972, p. 91-98; Griffiths 1974c, p. 321; 1975, p. 162.

Paraphoxus maculatus Chevreux, 1888: Chevreux 1900, p. 34-36; Chevreux & Fage 1925, p. 103-104; Stebbing 1906, p. 183.

Material examined: Tomioka Bay.

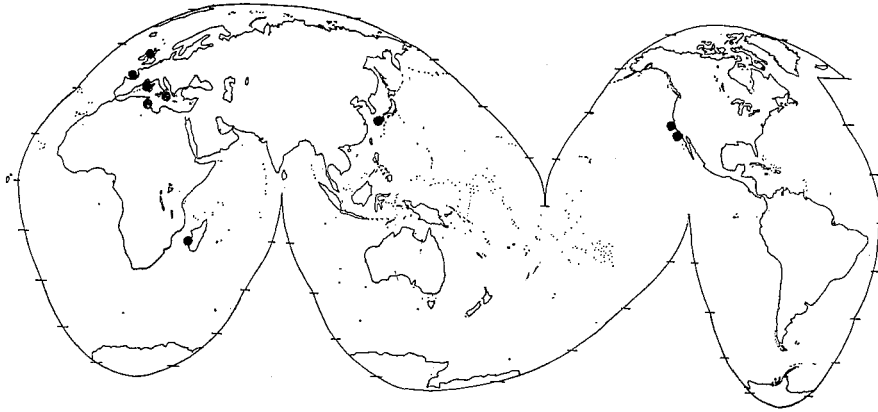


Fig. 253. Distribution of *Paraphoxus oculatus* (Sars) (●) in the world.

***Paraphoxus tomiokaensis* sp. nov.**

(Figs 254–256)

Body. Head: rostrum straight, extending far beyond peduncular segment 1 of antenna 1, hood-like; anteroventral angles of both lateral sides obtusa, not projected forward. Eyes oval and very large in male. Pleonal epimeron 2 roundly protruded forward, almost perpendicular posteriorly; pleonal epimeron 3 gradually expanding backward. Urosomite 1 upheaved on anterior 2/3 of its back; urosomite 3 provided with 1 spine on a ventrodiscal angle of both lateral sides.

Antennae of male. Antenna 1 longer than head length; peduncular segment 1 stout, a little protruded upper-distally, pubescent on distal about 1/3 of the ventral margin; peduncular segment 2 longer than half as long as segment 1, provided with 3 stout and stiff setae; peduncular segment 3 2/3 as long as segment 2; accessory flagellum 4-articulate; main flagellum consisting of eight segments, its segments 2–3 provided with 1 calceolus distally. Antenna 2 longer than body length; peduncular segment 1 not ensiform; peduncular segment 3 pubescent on distal about 2/3 the length of its upper side; peduncular segment 4 obliquely truncate, pubescent on its upper side, provided with 1 distal oblique row of 4 spines on the inner side, and 1 proximal, 2 medial and 2 distal spines on the upper side; peduncular segment 5 shorter than segment 4, provided with 1 set of 1 calceolus and 1 spine at distal a third of upper length and 1 distal set of 1 calceolus and several small setae; each segment of flagellum except for the terminal one provided with 1 calceolus distally.

Antennae of female. Antenna 1 similar to that of male except for the following characteristics: lacking the pubescent part of peduncular segment 1; ventrodiscal angle of peduncular segment 2 provided with 3 stout setae; main flagellum lacking calceoli. Antenna 2 similar to that of male except for the following characteristics: peduncular segments 3–4 lacking the pubescent part; peduncular segment 4 provided with 2 very long setae ventrodistally, together with 1 oblique row of 8 spines which

are various in length; peduncular segment lacking calceoli, provided with 5 spines on the distal part of inner side; flagellum lacking calceoli.

Mouthparts. Upper lip broad. Lower lip: inner plate well developed, even apically; shoulders provided with 1 gland cone on the inner side and 3 setae; mandibular process medium, obliquely extended. Maxilla 1: inner plate medium, oblong, with 2 setae apically; outer plate provided with 5 bifid and 6 unbifid tooth-like spines, 5 of the unbifid spines serrate unilaterally; palp uniarticulate (?), extending far beyond outer plate, triangular distally, truncate, its triangular part provided with 1 apical serrate seta and 3 basal setae, one of which is serrate; the part of uniform thickness of palp provided with 1 simple seta inner-distally. Maxilla 2: inner plate distinctly smaller than outer plate, provided with 1 facial oblique row of 4 setae; outer plate with 11 setae apically. Mandible: incisor provided with 3 teeth; lacinia mobilis of the left mandible broader than the counterpart in the right mandible, serrate; accessory spines stout, 7 in number, more or less serrate unilaterally; molar process very small, provided with 4 stout spines; palp well developed, consisting of three segments, relative lengths of segments 2.5:7.0:6.0; palp segment 2 provided with 1 stiff seta inner-distally; palp segment 3 truncate, provided with 2 pairs of stiff setae on proximal a third of inner sides and 3 pairs of setae apically, which gradually increase in length. Maxilliped rather slender; inner plate small, provided with 4 setae apically, three of which are dispersively pinnate; outer plate not reaching the middle of palp segment 2, provided with 7 finely pubescent tooth-like spines which gradually increase in length; relative inner lengths of palp segments 1.0:8.5:4.5:4.5; palp segment 4 falcate.

Gnathopods 1-2. Cryptic, similar to each other. Coxae 1-2 subrectangular,

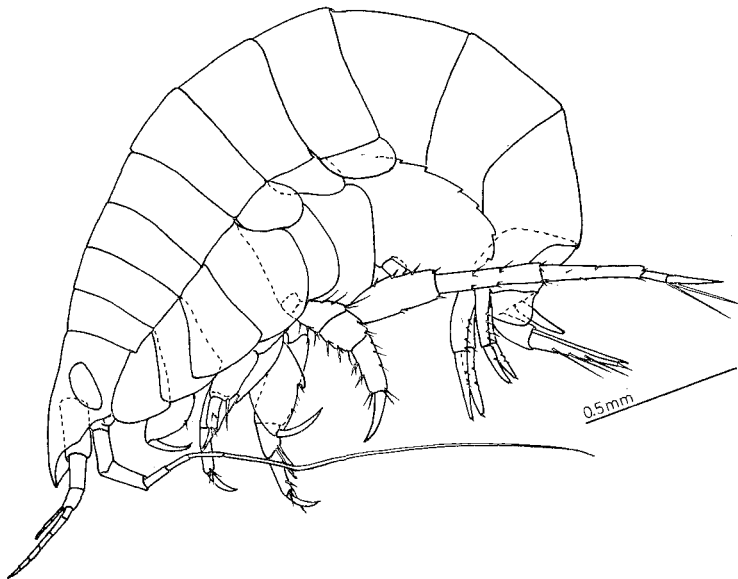


Fig. 254. *Paraphoxus tomiokaensis* sp. nov. Holotype, male, 3.5 mm.

provided with 1 row of 8 or 9 stiff setae along posterior half of ventral submargin. Merus and carpus subequal in length, obliquely connected with each other; carpus triangular, almost coming into contact with ischium. Propod subrectangular; palm oblique, defined by 1 spine and a blunt cusp. Dactyl falcate, reaching palmar cusp when closed, hooded.

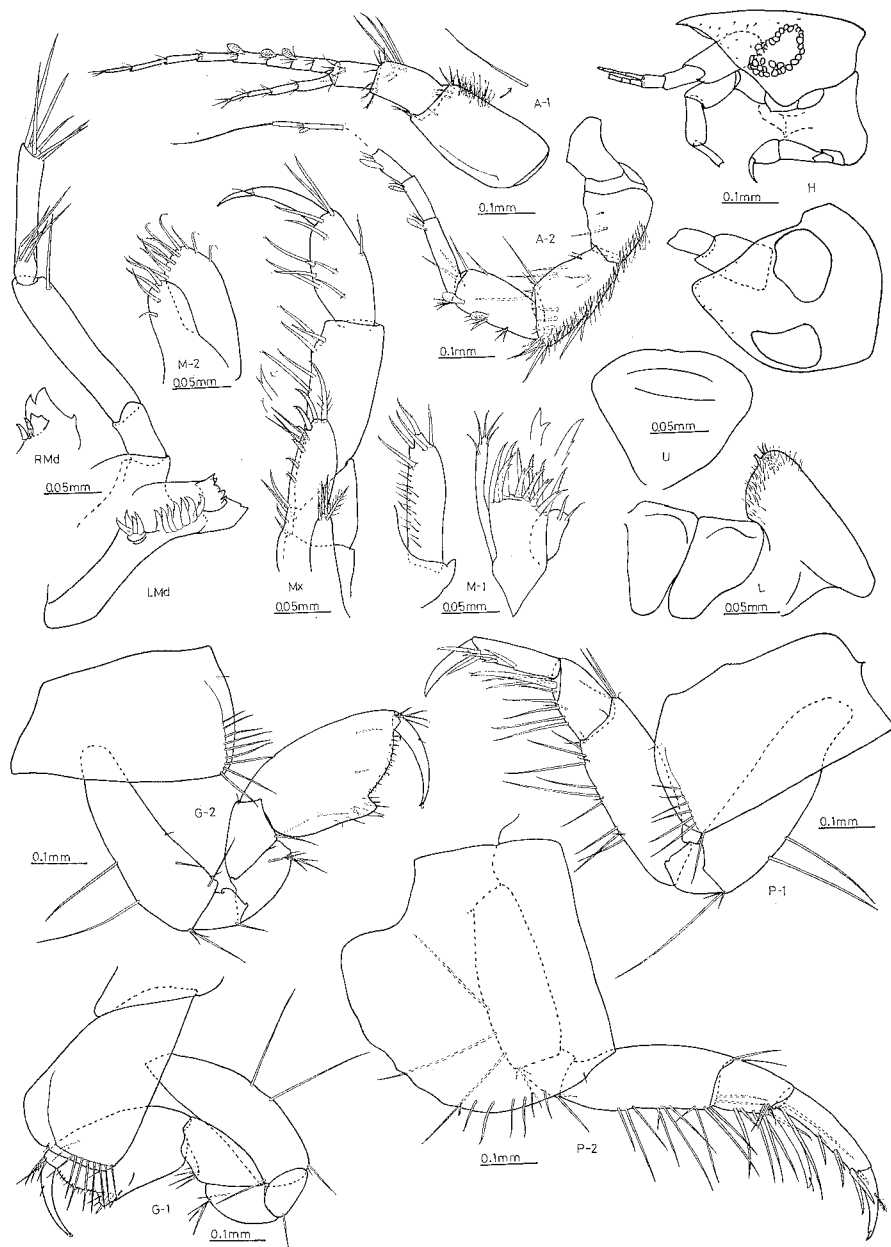


Fig. 255. *Paraphoxus tomiokaensis* sp. nov. Holotype, male, 3.5 mm.

Pereopods 1–2. Coxa 3 similar to coxa 2. Coxa 4 forming a quarter of circle, prominently excavate posteroproximally. Merus shorter than basis, a little protruded anterodistally. Carpus obliquely truncate, provided with 1 stout spine posterodistally which almost reaches the end of propod. Ratio of propod to dactyl

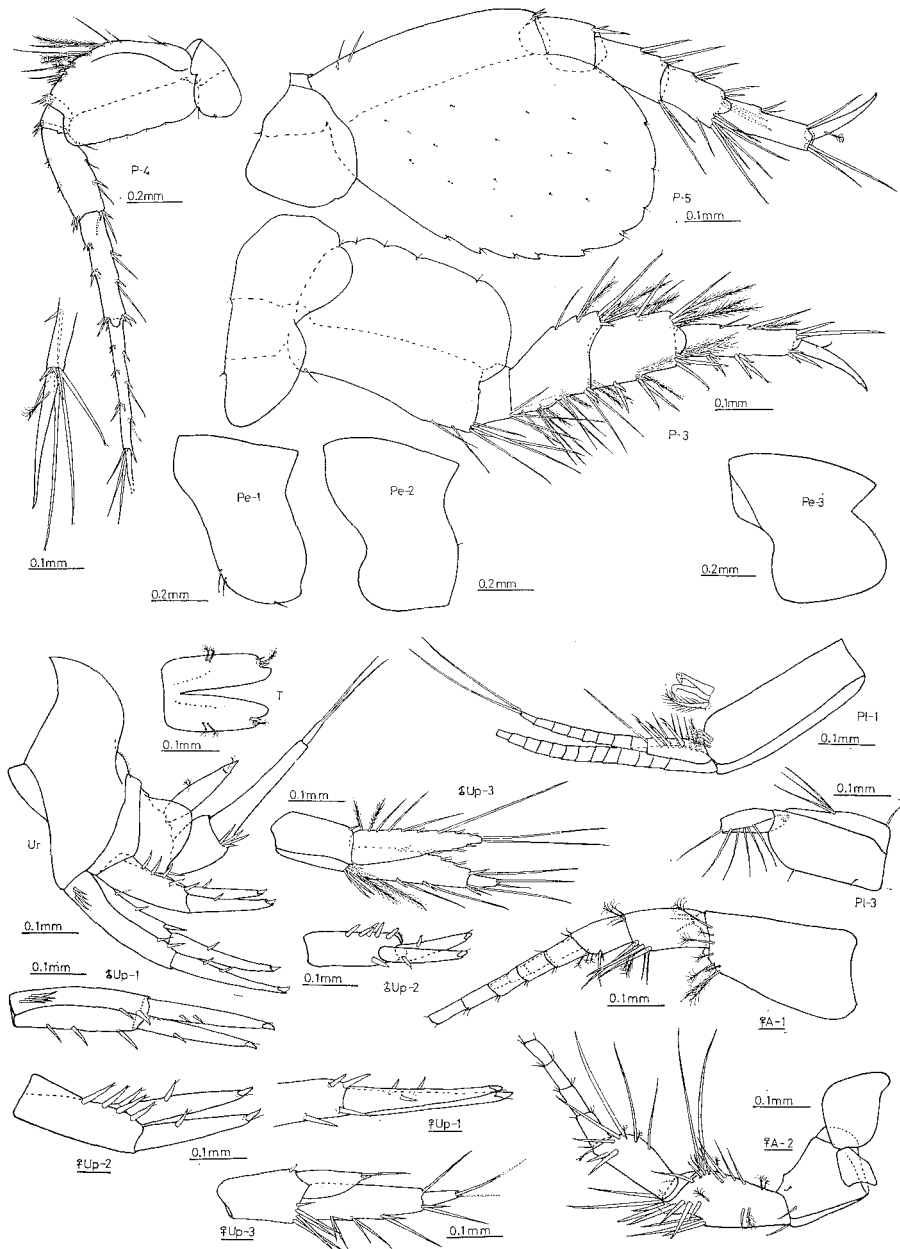


Fig. 256. *Paraphoxus tomiokaensis* sp. nov. Holotype, male, 3.5 mm. ♀ A-1, ♀ A-2, ♀ Up-1, ♀ Up-2, ♀ Up-3; paratype no. 3, female, 4.0 mm.

3:2 in length; posterior spine formula of propod 1-2-3 in pereopod 1, 2-3-3 in pereopod 2.

Pereopod 3. Coxa 5 bilobate. Relative anterior lengths of segments from basis to dactyl 9.0:1.5:3.7:4.0:5.0:3.7. Basis rectangular, not extending to the end of ischium; posterior thin plate broader than the muscular part. Merus extending to proximal a quarter the length of carpus; posterodistal extension truncate, armed with 2 pinnate setae and 3 spines distally, one of which is long. Propod half as thick as carpus, provided with 3 unequal spines both distally. Dactyl falcate.

Pereopod 4. Reaching almost to the tail when fully extended. Basis most expanded forward at the middle; posterior thin plate narrower than the muscular part, uniform in width. Merus, carpus and propod gradually lengthening and narrowing in a order. Dactyl half as long as propod, lanceolate.

Pereopod 5. Coxa 7 semioval. Basis prominently winged backward, extending to the end of merus, bluntly serrate posteriorly, provided with 1 pair of small spines anterodistally. Relative lengths of segments from ischium to dactyl 2.0:3.5:3.0:4.0:3.5. Ischium longer than wide, extending inward, with 1 pair of unequal spines anterodistally. Carpus provided with many long, slender spines posteriorly. Propod: locking spine only one in number, not reaching the tip of dactyl. Dactyl falcate.

Pleopods. Pleopods 1-2 similar; coupling spines paired, hooked distally, together with 1 pinnate seta; rami slender; proximal segment of inner ramus provided with 3 bifid and 1 unbifid setae; terminal swimming setae 2/3 times as long as rami. Peduncle of pleopod 3 shorter than the counterpart in pleopod 1.

Uropods. Uropod 1: peduncle provided with 1 oblique row of 4 spines on the proximal part of outer side and 2 outer and 3 inner spines on the upper side; rami equal in length, provided with a nail; inner ramus with 1 medial spine; outer ramus with 2 medial spines. Uropod 2 similar to uropod 1, though shorter than the latter; peduncle finely pectinate ventrodistally, provided with 5 or 4 outer and 1 inner-distal spines on upper side; rami provided with a nail, with 1 medial spine on each. Uropod 3: peduncle short, stout, provided with 6 ventrodistal slender and 1 inner-distal spines; outer ramus biarticulate, the terminal segment about a quarter the length of proximal one, truncate, provided with 2 apical setae which are pinnate in male and unpinnate in female; inner ramus of male a little longer than the proximal segment of outer ramus, with many pinnate setae; inner ramus of female about half as long as the proximal segment of outer ramus, ovate, provided with only 1 unpinnate seta apically.

Telson. Deeply cleft; each lobe rounded apically, provided with 2 spines and 1 pinnate seta on an outer-distal notch, together with a pair of penicillate setae outer-medially.

Material examined. Holotype: Male, 3.5 mm. Type locality: Ariake Sea. Date: June, 1976. Paratypes: 7 specimens. Collection No.: AMBL-Amph. 54.

Remarks. The present species well agrees with the redefinition of the genus

Paraphoxus by J.L. Barnard & Drummond (1978) except for the following points: 1) the molar process provided with 3 spines (4 spines in the present species), 2) setation on the maxilla 2 ordinary (rather reduced in the present species), and 3) each lobe of the telson provided with only one apical spine (with two spines in the present species). However, I think that these differences are triffling in the generic level in comparison with other allid genera within the subfamily Brolginae, *Cunmurra*, *Mandibulophoxus*, *Kuritus*, *Elpeddo*, *Wildus*, *Brolgus* and *Ganba* (see J.L. Barnard & Drummond (1978)).

The present species is distinguished from the species of *Paraphoxus* known to date by the above characteristics.

Phoxocephalus

Phoxocephalus prolixus sp. nov.

(Figs 257–259)

Body. Head: rostrum short, gently curved downward, not extending beyond the peduncular segment 1 of antenna 1; anterolateral plates deep, expanded almost perpendicularly. Eyes large, oval, coming into contact with each other. Pleonal epimera 2–3 similar to each other. Urosomite 1 not concave dorsally, protruded backward both laterally; anterior half of back in urosomite 3 upheaved, finely pectinate.

Antennae of male. Antenna 1 shorter than head length; peduncular segment 1 subequal to peduncular segments 2–3 combined in length, its upper extension more projected than the ventral one, reaching the middle of peduncular segment 2; peduncular segment 3 half as long as segment 2; accessory flagellum triarticulate, equal to the length of peduncular segments 2–3; main flagellum consisting of five segments; flagellum segments 1–3 provided with 1 calceolus distally. Antenna 2 shorter than body length; peduncular segment 1 not ensiform; upper margin of peduncular segment 3 densely bristly in rows, provided with 1 spine distally; peduncular segment 4 bristly on the upper margin, provided with 1 pair of spines and 1 marginal row of 5 spines and 2 thick setae upper-distally; upper margin of peduncular segment 5 armed with 1 transverse row of 3 spines and 1 spatulate tooth medially, and a set of 3 unequal spines, 1 spatulate tooth and 3 thick setae; most flagellum segments provided with 1 spatulate tooth distally.

Antennae of female. Antenna 1 similar to that of male. Antenna 2 short; peduncle similar to the counterpart in male in form, lacking the pubescent part of peduncular segments 3–4 and spatulate teeth on the peduncular segment 5, more spinous on the distal part of segments 4–5 than in male; flagellum short, lacking spatulate teeth, each segment shortened.

Mouthparts. Lower lip: mandibular process reduced; shoulders triangular. Maxilla 1: inner plate rectangular, unarmed; outer plate provided with 3 bifid and

4 simple spines; palp uniarticulate, with 3 minute setae apically. Maxilla 2: both plates oblong, subequal in size, with 3 setae apically. Mandible rather slender; palper hump prominently protruded forward; incisor and lacinia mobilis broad, serrate; accessory spines 3 in number, finely pectinate; molar process triturative, distinctly protruded; molar rasp tuberosus; palp consisting of 3 segments, almost uniform in width; palp segment 1 small; palp segment 2 as long as palp segment 3, provided with 2 setae inner-distally; palp segment 3 obliquely truncate, with 8 long setae apically and 1 long stiff seta on a point at proximal a third the length. Maxilliped: inner plate clavate, provided with 2 small setae apically; outer plate not extending beyond the end of palp segment 1, provided with 1 apical tooth-like spines and 2 small setae on the inner margin; palp consisting of four segments; proximal two segments broadly expanded; palp segment 3 half as long as segments 1-2 combined; palp segment 4 as long as segment 3, slender, provided with a nail and 1 small seta apically.

Gnathopods 1-2. Similar to each other except for a complex of merus and carpus, cryptic. Coxae 1-2 rectangular, acute anterodistally, with 4 short setae on the posterior half of each ventral submargin. Gnathopod 1: merus $2/3$ times as long as carpus, meeting the middle expansion of carpus with 1 small seta posterodistally; carpus growing at the proximal part of merus, furnished with a backward expansion medially, which is armed with 1 short terminal seta, concave in distal a half of its posterior margin, the concavity of which receives the propod. Gnathopod 2: merus extending far beyond the backward expansion of carpus, meeting to propod, narrowed on its distal a third the length, provided with 1 seta apically; carpus furnished with the backward expansion at proximal about a third the length, its expansion with 1 short seta apically, the posterior concavity from the expansion receiving the propod. Propod rectangular, provided with a stout tooth and 1 spine posterodistally; palp transverse, armed with thick and small setae. Dactyl falcate, reaching the inner side of posterodistal tooth of propod when closed.

Pereopods 1-2. Coxa 3 similar to coxa 2. Coxa 4 about 1.5 times as broad as coxa 3, deeply excavated posteroproximally, acute posterodistally. Relative lengths of segments from basis to dactyl 6.0:1.5:5.6:2.5:3.0:2.7. Posterodistal extension of

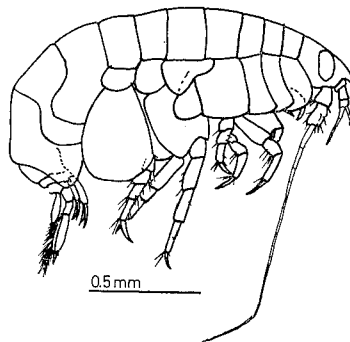


Fig. 257. *Phoxocephalus prolixus* sp. nov. Holotype, male, 2.5 mm.

merus small, truncate, armed with 2 short setae. Carpus provided with 2 unequal spines posterodistally, one of which is stout and is as long as propod. Propod provided with 1 short seta posteromedially and 2 locking spines. Dactyl falcate.

Pereopod 3. Coxa 5 bilobate; the anterior lobe about twice as deep as the

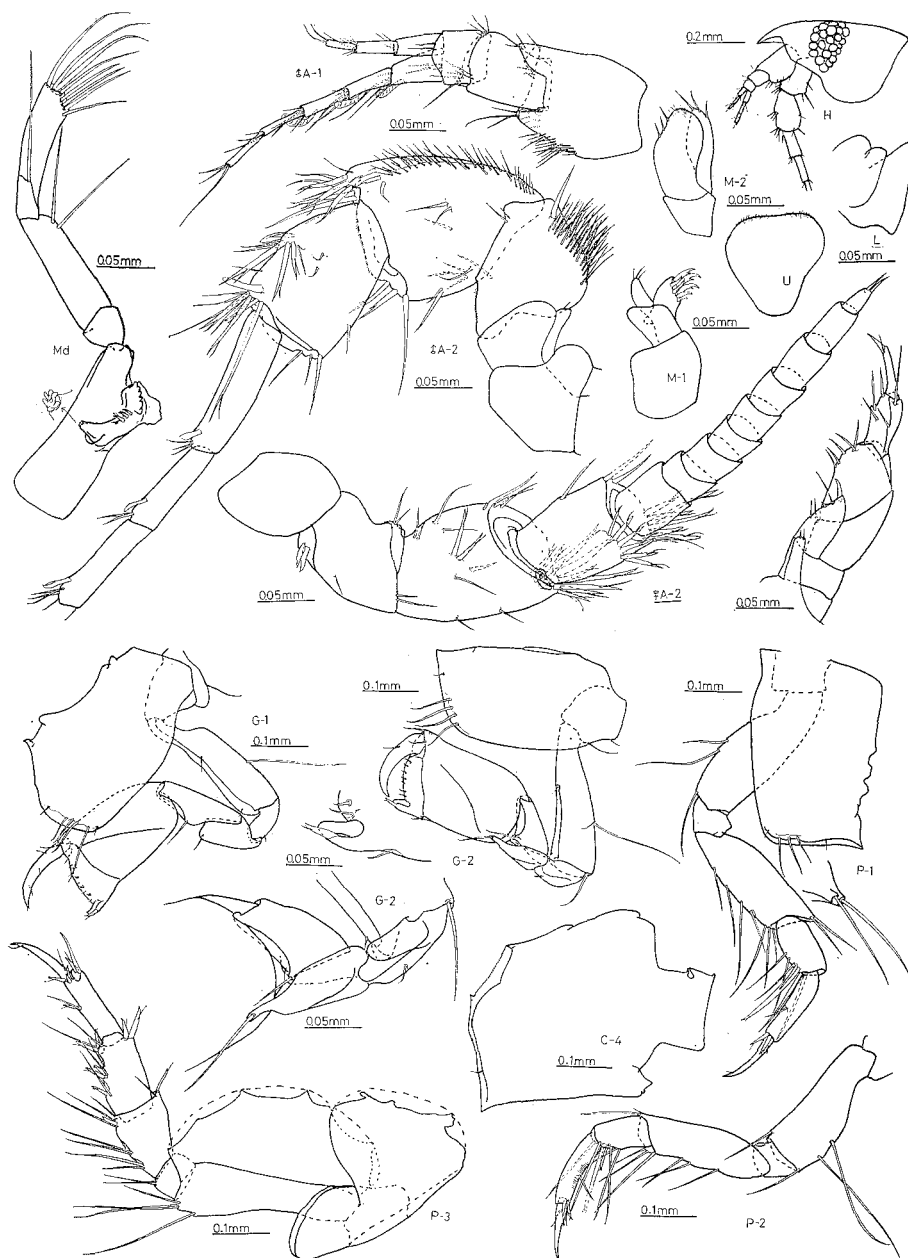


Fig. 258. *Phoxocephalus prolixus* sp. nov. Holotype, male, 2.5 mm. ♀ A-2; paratype no. 2, female, 2.0 mm.

posterior one. Basis straight anteriorly, broadly expanded backward in semicircle. Merus, carpus and propod subequal in length. Merus with 1 spine on both distal ends. Carpus provided with 1 pair of spines posterodistally; anterior spine formula 1-2-2. Propod provided with 1 anteromedial set of 1 spine and 1 short seta, 2 unequal spines posteriorly and 3 spines anterodistally. Dactyl scimitar, shorter than

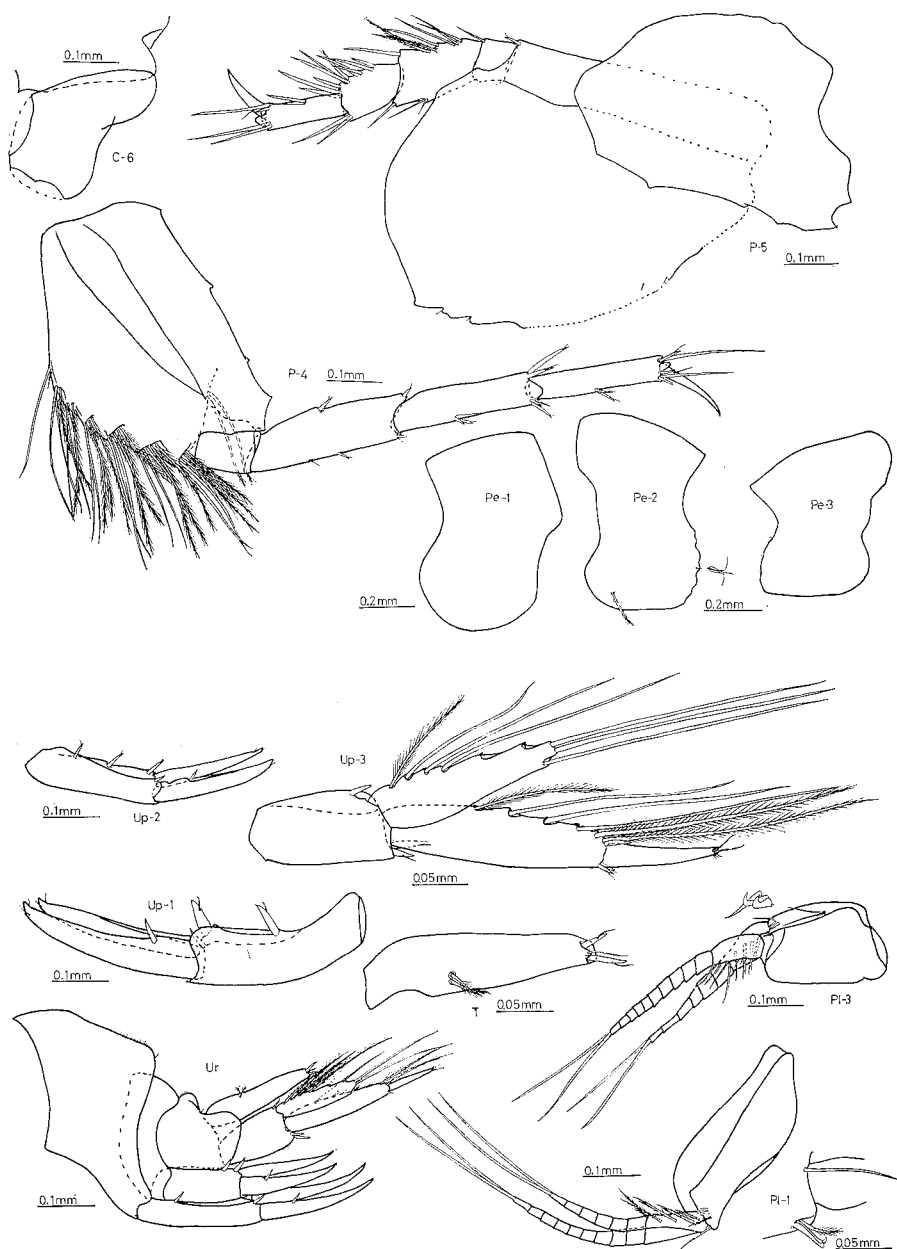


Fig. 259. *Phoxocephalus prolixus* sp. nov. Holotype, male, 2.5 mm.

propod.

Pereopod 4. Coxa 6 bilobate, anterior lobe shallow. Basis most expanded forward medially, provided with 7 transverse rows of 1 or 2 unplumose and 1 to 3 plumose setae on anterior about half the length; posterior thin plate rather slender, extending to the end of ischium. Merus, carpus and propod gradually decreasing in length, slender. Merus a little extended posterodistally, provided with 1 antero-medial and 1 anterodistal spines. Carpus provided with 1 pair of unequal spines posterodistally, and 1 medial pair of spines and 1 distal set of 2 spines and 1 seta anteriorly. Propod provided with 1 medial pair of spines and 1 distal set of 2 locking spines and 1 long stiff seta anteriorly, and 1 set of 1 spine and 1 long stiff seta posterodistally. Dactyl scimitar.

Pereopod 5. Coxa unilobate, small. Relative anterior lengths of segments from basis to dactyl 12.0:1.5:4.0:3.0:3.5:2.5. Basis prominently expanded backward, extending beyond the middle of carpus, transversely truncate ventrally, provided with 1 spine anterodistally. Merus armed with 1 long spine anterodistally. Carpus provided with 1 pair of long spines posterodistally; anterior spine formula 2-2-3-3. Propod provided with 1 medial seta and 1 distal set of 1 seta and 1 spine anteriorly, and 2 setae posterodistally, these setae stiff and longer. Dactyl scimitar.

Pleopods. Pleopods 1-2 similar; peduncle longer than that of pleopod 3, locking spines paired, hooked, together with 1 pinnate seta, though with 1 unpinnate seta in pleopod 3. Rami unequal in length; inner ramus provided with 3 bifid and 2 unbifid setae on the proximal segment; terminal swimming setae long.

Uropods. Uropod 1 extending beyond uropod 2; peduncle as long as rami, its inner-distal and outer-medial spines stout, though an outer-distal spine small; rami equal in length, acuminate; outer ramus provided with 1 spine on a point at proximal a third the length. Uropod 2 similar to uropod 1, though spines not stout. Uropod 3 prominently extended backward; peduncle shorter than inner ramus, provided with 1 spine inner-distally and 1 pair of spines ventrodistally; outer ramus biarticulate, its proximal segment twice as long as the terminal one, provided with 1 pair of spines outer-distally, 5 long pinnate setae on distal 2/3 the inner margin and 1 set of 1 spine and 1 long pinnate seta inner-distally; terminal segment of outer ramus truncate, provided with 2 minute setae apically; inner ramus 3/4 the length of the proximal segment of outer ramus, provided with 6 single setae on the inner margin, 1 seta outer-distally and 2 apical setae, these setae long and pinnate.

Telson. Completely cleft; each lobe rather slender, truncate, provided with 2 spines and 1 small seta apically, and a pair of penicillate setae at basal a third the length of inner margin.

Material examined. Holotype: Male, 2.5 mm. Type locality: Ariake Sea. Date: June 11, 1976. Paratypes: 2 specimens. Collection No.: AMBL-Amph. 20.

Remarks. The present species has the following characteristics: the antenna 2 not ensiform; gnathopods 1-2 different and cryptic; the mandibular process vestigial; the setation of maxilla 2 reduced; the molar process small and rugose; the terminal

segment of outer ramus in the uropod 3 elongate. These characteristics are present also in other members of the *Phoxocephalus* (J.L. Barnard 1960a, J.L. Barnard & Drummond 1978, Della Valle 1893, Gurjanova 1951, Lincoln 1979, Sars 1989, Schellenberg 1942, Stebbing 1906). However, the present species has a unique characteristic, that is, the merus of gnathopod 2 protrudes distally far beyond the backward expansion of carpus and forms a prominent slender extension. Such an extension is not formed in any other congeneric species. Hence, the present species is clearly distinguished from the other species of *Phoxocephalus* by this difference.

Metaphoxus

Metaphoxus fultoni (Scott, 1890)

(Figs 260–263)

Phoxocephalus Fultoni Scott, 1890.

Metaphoxus fultoni (Scott, 1890): Walker 1895, p. 296; 1901, p. 299; Stebbing 1906, p. 139; Chevreux & Fage 1925, p. 106–107; Fage 1933, p. 203–207; J.L. Barnard 1960a, p. 304; 1964a, p. 196; Hamond 1967, p. 119; Ledoyer 1968, p. 28–29; Karaman 1972, p. 79–84; J.L. Barnard & Drummond 1978, p. 468.

Material examined. Female, 2.5 mm, Ariake Sea and Tomioka Bay. Collection No.: AM-BL-Amph. 55. (2 specimens).

Body. Head as long as pereonites 1–3 combined; rostrum short, slightly decurved; inferior antennal sinus reaching the middle of head. Eyes small, circular. Pleonites 1–3 equal in width; pleonal epimeron 1 extended backward; pleonal epimeron 3 cut perpendicularly on the anterior margin, gradually expanding backward, provided with 2 small notches posteriorly.

Antennae. Antennae 1–2 subequal in length, slightly longer than head length. Antenna 1: peduncular segment 1 extending to the middle of peduncular segment 2 upper-distally; peduncular segment 2 extending to the middle of peduncular segment 3; peduncular segment 3 a third the length of peduncular segment 1; accessory flagellum triarticulate; main flagellum 4-articulate. Antenna 2: peduncular segment 1 not ensiform; peduncular segment 5 $2/3$ times as long as peduncular segment 4; flagellum triarticulate, its segment 1 about half the length of peduncular segment 5.

Mouthparts: Massive. Upper lip broad. Lower lip broken; mandibular process weakly developed. Maxilla 1: inner plate rather large, unarmed; outer plate provided with 7 tooth-like spines, three of which are bifid, other three of which are finely pectinate unilaterally and simple; palp uniarticulate, provided with 3 setae apically. Maxilla 2: both plates fused with each other at their proximal halves; inner plate unarmed; outer plate armed with 3 setae apically. Mandible: incisor small; lacinia mobilis of one mandible (? left) broad, serrate, the counterpart in the other prominently smaller than the former; accessory spines 3 in number in one mandible (? left) and 2 in the other; molar process not triturative, small, provided with 4 small spines; palper hump well projected forward; palp consisting of three

segments, of which 2 proximal segments are uniform in thickness; palp segment 2 obliquely truncate; palp segment 3 a little shorter than segment 2, obliquely truncate, armed with 8 stern setae apically. Maxilliped rather slender; inner plate clavate, provided with 2 setae apically; outer plate extending to distal a third of the palp segment 1, tapering, with 2 tooth-like spines and 1 seta; palp consisting of four segments, of which 2 proximal segments are uniform in width; palp segment 2 with 5 small setae on inner margin; palp segment 3 oblong, as long as the segment 2, obtusa distally; palp segment 4 half as long as the segment 3, truncate, with a nail and 1 minute seta.

Gnathopods 1-2. Similar to each other in form and size except for merus and carpus, cryptic. Coxae 1-2 provided with 2 short and 1 or 2 small setae on the posteroventral submargin which finely ridges. Gnathopod 1: merus longer than ischium, meeting the backward expansion of carpus, not protruded posterodistally, armed with 1 small seta posterodistally; carpus furnished with the backward expansion at the middle, its expansion armed with 1 stiff seta terminally. Gnathopod 2: merus 1.5 times as long as ischium in a posterior margin, prominently extending and provided with 1 long spine posterodistally; carpus almost extending in a

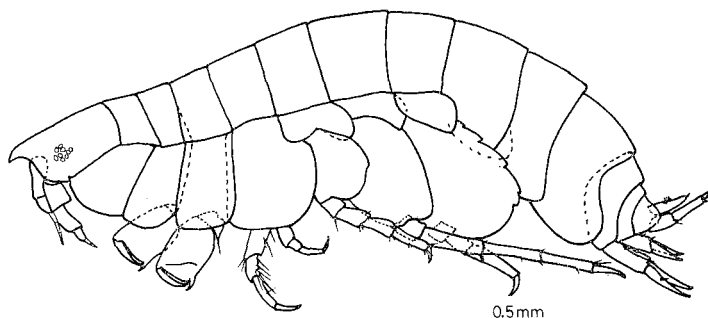


Fig. 260. *Metaphoxus fultoni* (Scott). Male, 2.5 mm.

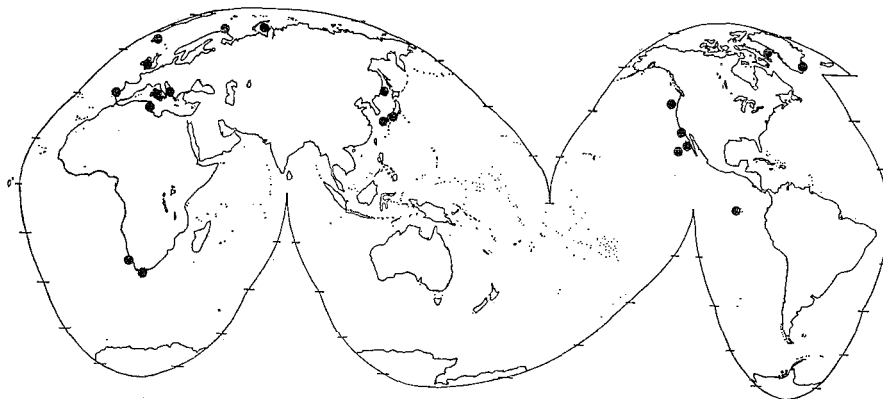


Fig. 261. Distribution of *Metaphoxus fultoni* (Scott) (●) in the world.

perpendicular direction to the merus, with 1 seta at the inner-proximal part of distal margin; distal margins of merus and carpus forming a concavity which receives the propod. Propod rectangular, shorter than basis, furnished with a prominent extension posterodistally, which is provided with 1 spine on its inner base; palm transverse, with many small setae. Dactyl falcate, reaching the inner side of posterior



Fig. 262. *Metaphoxus fultoni* (Scott). Male, 2.5 mm.

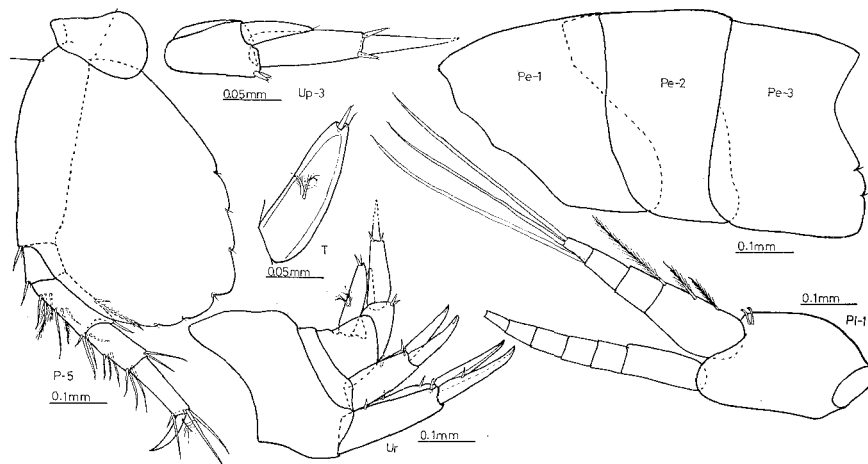


Fig. 263. *Metaphoxus fultoni* (Scott). Male, 2.5 mm.

tooth of propod when closed, hooded.

Pereopods 1-2. Similar to each other except for coxae. Coxa 3 similar to coxa 2. Coxa 4 1.5 times as broad as coxa 3, strongly excavate posteroproximally. Relative posterior lengths of segments from basis to dactyl 6.0:1.5:4.5:2.0:2.5:2.0. Carpus provided with 1 long stout spine posterodistally, together with 1 smaller spine in pereopod 1. Propod armed with 1 stiff seta posteromedially and a pair of locking spines. Dactyl falcate.

Pereopod 3. Coxa 5: posterior lobe 3 times as deep as anterior one. Relative anterior lengths of segments from basis to dactyl 7.0:1.3:3.0:2.2:2.5:1.8. Basis prominently winged backward in a semicircle, straight anteriorly. Merus provided with 1 set of 1 spine and 3 setae anterodistally. Carpus provided with 2 sets of 2 spines and 2 setae both anteromedially and anterodistally, with 1 spine posterodistally. Propod provided with a pair of setae anteromedially, and a pair of unequal spines both anterodistally and posterodistally.

Pereopod 4. Coxa 6 similar to coxa 5, though prominently smaller than the latter. Relative anterior lengths of segments from ischium to dactyl 2.0:5.5:5.0:4.5:2.5. Basis prominently protruded forward at the middle, its anterior declivous margin provided with 4 transverse rows of 4 or 5 pinnate setae; posterior thin plate slender, uniform in width, not extending beyond ischium. Merus with 1 posteromedial, 1 posterodistal and 1 anterodistal spines. Carpus with 1 anteromedial, 3 anterodistal and 2 posterodistal spines. Propod with 3 unequal spines anterodistally and 2 unequal spines posterodistally.

Pereopod 5. Coxa 7 small. Relative lengths of segments from ischium to dactyl 1.1:3.3:2.5:2.9:1.9. Basis prominently expanded, extending to the end of merus, bluntly serrate, provided with 1 spine anterodistally. Ischium subrectangular, provided with 1 spine anterodistally. Merus with 3 transverse rows of 3 or 4 pinnate and unpinnate setae anteriorly, 1 set of 1 spine and 1 pinnate seta posteromedially,

and 1 spine posterodistally. Carpus with a transverse row of 3 unipinnate setae both anteromedially and anterodistally, and a pair of setae posterodistally. Propod with a pair of long spines posterodistally, and a pair of locking spines anterodistally, one of which is elongate.

Pleopods. Pleopods well developed. Pleopod 1: peduncle stout, extended outer-distally, provided with a pair of coupling spines which are bifid; outer ramus longer than inner ramus, 6-articulate; inner ramus 4-articulate, its proximal segment with 2 bifid and 1 unbifid setae; terminal swimming setae subequal to outer ramus in length.

Uropods. Uropod 1 not extending beyond the end of uropod 3; peduncle longer than rami, provided with 1 proximal and 1 distal spines on both outer margins of upper side; rami equal in length, provided with an apical nail; outer ramus with 1 medial spine; inner ramus unarmed. Uropod 2 similar to uropod 1, though shorter than the latter; peduncle provided with 1 spine on both outer-distal ends of upper side, together with 1 inner-medial spine; rami provided with an apical nail, lacking spines. Uropod 3 shorter than uropod 1; peduncle stout, a little shorter than the proximal segment of outer ramus, provided with a pair of spines ventrodistally; outer ramus consisting of two segments, of which the proximal segment is a little longer than the distal one and is armed with 2 confronting spines distally; the distal segment of outer ramus attenuate, unarmed; inner ramus $3/4$ times as long as the proximal segment of outer ramus, attenuate, provided with 1 minute seta apically.

Telson. Completely cleft; each lobe provided with a pair of penicillate setae medially, and 1 set of 1 spine and 1 minute seta apically.

Remarks. The present specimens well agree with Karaman's description and figures (1972) based upon specimens from Adriatic Sea except for the following minor characteristics: in his specimens, 1) the segments 2-3 of main flagellum in the antenna 2 provided with an aesthetasc (lacking it in the present specimens); 2) the outer ramus of uropod 1 lacking spines (with a spine medially in the present specimens); 3) the telson not cleft throughout (completely cleft in the present specimens). However, the former two characteristics (articles 1-2) were not found by Chevreux & Fage (1925) or Ledoyer (1968). The last characteristic (article 3) is, further, unclear in theirs.

(To be continued)
